Liebert® eXL™ Battery System

Installation Manual

EMERSON
Network Power

BATTERY CABINET PRECAUTIONS

The following warning applies to all battery cabinets supplied with UPS systems. Additional warnings and cautions applicable to battery cabinets may be found in **Important Safety Instructions** beginning on page 1.

WARNING

Internal battery strapping must be verified prior to moving a battery cabinet (after initial installation).

- Battery cabinets contain non-spillable batteries.
- Keep units upright.
- Do not stack.
- Do not tilt.

Failure to heed this warning could result in smoke, fire or electric hazard.

Call 1-800-LIEBERT prior to moving battery cabinets (after initial installation).

AVERTISSEMENT

L'arrimage des batteries internes doit être vérifié par le fabricant avant de déplacer une armoire de batteries (après l'installation initiale).

- Les armoires de batteries contiennent des batteries étanches.
- Maintenir les systèmes à la verticale.
- Ne pas empiler.
- Ne pas incliner.

Le non-respect de ces consignes comporte des risques liés à la fumée, au feu ou à l'électricité. Composez le 1 800 LIEBERT avant de déplacer des armoires de batteries (après l'installation initiale).

CONTACTING EMERSON NETWORK POWER® FOR SUPPORT

To contact the Emerson Network Power Liebert® Services for information or repair service in the United States, call 1-800-LIEBERT (1-800-543-2378). Liebert Services offers a complete range of startup services, repair services, preventive maintenance plans and service contracts.

For repair or maintenance service outside the 48 contiguous United States, contact Liebert Services, if available in your area.

For Liebert Services to assist you promptly, have the following information available:

Part Numbers:	
Serial Numbers:	
Rating:	
Date Purchased:	
Date Installed:	
Location:	
Battery Voltage:	
Battery Reserve Time:	

Product Warranty Registration

To register for warranty protection, visit the **Service and Support** section of our Web site at:

www.liebert.com

Click on **Product Registration** and fill out the form.

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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation of your Liebert *e*XL Battery Cabinet and accessories. Read this manual thoroughly, paying special attention to the sections that apply to your installation, before working with the battery system. Retain this manual for use by installing personnel.

WARNING

Risk of electrical shock. Can cause personal injury and death.

Check for voltage with both AC and DC voltmeters before working within the UPS. Check for voltage with both AC and DC voltmeters before making contact.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should be involved in installing the UPS or preparing the UPS for installation. When performing maintenance with any part of the equipment under power, service personnel and test equipment should be standing on rubber mats.

Lead-acid batteries contain hazardous materials. Batteries must be handled, transported and recycled or discarded in accordance with federal, state and local regulations. Because lead is a toxic substance, lead-acid batteries must be recycled rather than discarded.

Do not dispose of battery or batteries in a fire. The battery may explode.

Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It is toxic.

The following precautions must be observed when working on batteries:

- Remove watches, rings and other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine whether the battery is grounded. If it is grounded, remove source of ground.

Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.

AVERTISSEMENT

Risque de décharge électrique pouvant causer des blessures graves, voire mortelles.

Vérifiez les tensions au moyen de voltmètres c.a. et c.c. avant d'utiliser le système ASC. Vérifiez les tensions avec des voltmètres c.a. et c.c. avant d'établir tout contact.

Seuls des employés qualifiés et dûment formés portant un casque, des gants, des chaussures et des lunettes de écurité adéquats doivent se charger d'installer le système ASC ou de le préparer pour l'installation. Les responsables de l'entretien et l'équipement d'essai doivent reposer sur des tapis de caoutchouc lors de toute intervention sur une pièce d'équipement sous tension.

Les batteries au plomb-acide renferment des matières dangereuses. Les batteries doivent être manipulées, transportées, recyclées ou jetées conformément aux règlements fédéraux, provinciaux et municipaux. Étant donné que le plomb est une substance toxique, les batteries au plomb-acide doivent être recyclées plutôt que mises au rebut.

Ne jetez jamais de batteries au feu car elles risquent d'exploser.

Vous ne devez ni ouvrir ni percer les batteries, car l'électrolyte qui s'en écoulerait est nocif pour la peau et les yeux. Cet électrolyte est toxique.

Lorsque vous travaillez avec des batteries, prenez les précautions suivantes :

- Retirez montre, bagues et tout autre objet métallique.
- Utilisez des outils dont le manche est isolé.
- Portez des gants et des bottes de caoutchouc.
- Ne posez aucun outil ni pièce métallique sur le dessus d'une batterie.
- Déconnectez la source de chargement avant de brancher ou de débrancher les bornes d'une batterie.
- Vérifiez si la batterie est mise à la terre. Le cas échéant, éliminez la cause de la mise à la terre.

Le contact avec toute partie d'une batterie mise à la terre peut provoquer une décharge électrique. Pour réduire de tels risques d'accident, débranchez les prises de terre avant de procéder à l'installation ou à l'entretien.

WARNING

Risk of electric shock. Can cause personal injury and death.

In case of fire involving electrical equipment, use only carbon dioxide fire extinguishers or those approved for use in fighting electrical fires.

AVERTISSEMENT

Risque de décharge électrique pouvant causer des blessures graves, voire mortelles.

En cas d'incendie associé à du matériel électrique, n'utilisez que des extincteurs à dioxyde de carbone ou homologués pour la lutte contre les incendies d'origine électrique.

WARNING

Risk of heavy unit falling over. Improper handling can cause equipment damage, injury or death.

Exercise extreme care when handling battery cabinets to avoid equipment damage or injury to personnel. The battery system cabinets weigh up to 3760 to 8990 lb. (1706 to 4078kg).

Locate center of gravity symbols and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.

Slots at the base of the module cabinets are intended for forklift use. Base slots will support the unit only if the forks are completely beneath the unit.

Read all of the following instructions before attempting to move, lift, or remove packaging from unit, or prepare unit for installation.

AVERTISSEMENT

Le centre de gravité élevé de l'appareil présente un risque de renversement. Une mauvaise manutention peut entraîner des dommages matériels, des blessures et même la mort.

Faites preuve d'une extrême prudence lors de la manutention des armoires ASC afin d'éviter de les endommager ou de blesser le personnel. Le module ASC pèse jusqu'à 2 601kg (5 735lb).

Identifiez les symboles de centre de gravité et déterminez le poids de l'appareil avant de manipuler chaque armoire. Testez le levage et l'équilibre des armoires avant de transporter l'appareil. Maintenez en tout temps l'inclinaison verticale minimale.

Les fentes situées à la base des armoires du module sont conçues pour utiliser le chariot élévateur. Les fentes situées à la base peuvent soutenir le système seulement si les fourches se trouvent complètement sous le système.

Lisez toutes les instructions ci-dessous avant de tenter de déplacer, lever, déballer ou préparer le système en vue de son installation.

WARNING

Risk of electrical shock and fire. Can cause equipment damage, personal injury or death.

Under typical operation and with all UPS doors closed, only normal safety precautions are necessary. The area around the UPS system should be kept free of puddles of water, excess moisture and debris.

Only test equipment designed for troubleshooting should be used. This is particularly true for oscilloscopes. Always check with an AC and DC voltmeter to ensure safety before making contact or using tools. Even when the power is turned Off, dangerously high potential electric charges may exist at the capacitor banks and at the DC connections.

All wiring must be installed by a properly trained and qualified electrician. All power and control wiring must comply with all applicable national, state and local codes.

One person should never work alone, even if all power is disconnected from the equipment. A second person should be standing by to assist and to summon help in case of an accident.

AVERTISSEMENT

Risque de décharge électrique et d'incendie. Pouvant entraîner des dommages matériels, des blessures et même la mort.

Les précautions de sécurité habituelles suffisent lorsque le système ASC est en mode de fonctionnement normal et que toutes les portes sont fermées. La zone entourant le système ASC doit être exempte de flaques d'eau, d'humidité excessive et de débris.

Seuls des équipements d'essai conçus pour le dépannage doivent être utilisés. Cette mise en garde couvre notamment les oscilloscopes. Utilisez toujours un voltmètre c.a. et c.c. pour vérifier les tensions avant d'établir un contact ou d'utiliser des appareils. Des tensions dangereusement élevées peuvent demeurer dans les batteries de condensateurs et au niveau des raccords c.c., même une fois l'alimentation coupée.

Tous les raccords doivent être effectués par un électricien dûment formé et qualifié. Tous les câbles d'alimentation et de commande doivent être conformes aux codes nationaux et locaux en vigueur.

Une personne ne devrait jamais travailler seule, même si toute l'alimentation d'entrée est coupée. Une deuxième personne devrait toujours être présente pour porter assistance ou chercher de l'aide en cas d'accident.

NOTE

Materials sold hereunder cannot be used in the patient vicinity (e.g., use where UL, cUL or IEC 60601-1 is required). Medical applications such as invasive procedures and electrical life support equipment are subject to additional terms and conditions.

NOTICE

This unit complies with the limits for a Class A digital device, pursuant to Part 15 Subpart J of the FCC rules. These limits provide reasonable protection against harmful interference in a commercial environment. This unit generates, uses and radiates radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this unit in a residential area may cause harmful interference that the user must correct at his own expense.

1.0 MECHANICAL INSTALLATION

1.1 Introduction

This following section describes the requirements that must be taken into account when planning the positioning and cabling of the Liebert *e*XL battery equipment.

This chapter is a guide to general procedures and practices that should be observed by the installing engineer. The particular conditions of each site will determine the applicability of such procedures.

NOTICE

Do not apply electrical power to the UPS equipment before the arrival of the commissioning engineer.

1.2 Preliminary Checks

Before installing the battery equipment, please carry out the following preliminary checks:

- Visually examine the equipment for transit damage, both internally and externally. Report any damage to the shipper immediately.
- Verify that the correct equipment is being installed. The equipment supplied has an identification tag inside the main door.
- Verify that the battery room satisfies the environmental conditions stipulated in the equipment specification, paying particular attention to the ambient temperature and air exchange system.

1.3 Environmental Considerations

1.3.1 Battery Room

Batteries should be mounted in an environment where the temperature is consistent and even over the whole battery. Temperature is a major factor in determining the battery life and capacity. Typical battery manufacturer performance data are quoted for an operating temperature between 68 and 77°F (20 and 25°C). Operating above this range will reduce the battery life while operation below this range will reduce the battery capacity.

Battery Temperature

In a normal installation, the battery temperature should be kept between 59 and 77°F (15°C and 25°C).

NOTE
Keep batteries away from main heat sources, main air inlets, etc.

1.3.2 Storage

Should the equipment not be installed immediately, it must be stored in a room for protection against excessive humidity and heat sources (see **Table 3**).

NOTICE

Risk of deep discharge can cause permanent damage to batteries.

An unused battery must be recharged periodically as recommended by the battery manufacturer.

1.4 Positioning

The cabinet is structurally designed to handle lifting from the base.

Power terminals, auxiliary terminals blocks and power switches are accessed from the front and top.

Removable panels on the top are secured to the chassis by screws. The door can be opened to give access to the power connections bars, auxiliary terminal blocks and power isolators. The front door can be opened 180° for easier service and more flexibility in installation.

1.4.1 Moving the Cabinets

The route to be travelled between the point of arrival and the unit's installation location must be planned to make sure that all passages are wide enough for the unit and that floors are capable of supporting its weight (for instance, check that doorways, lifts, ramps, etc., are adequate and that there are no impassable corners or changes in the level of corridors).

Ensure that the cabinet weight is within the designated surface weight loading (kg/cm^2) of any handling equipment. See **Table 3** for weight details.

Ensure that any lifting equipment used to move the battery equipment has sufficient lifting capacity.

Battery system equipment can be handled by a forklift or similar equipment.

Because the weight distribution in the cabinet is not symmetrical, use extreme care during handling and transporting.

When moving the unit by forklift, care must be taken to protect the panels. Do not exceed a 15° tilt with the forklift. Bottom structure will support the unit only if the forks are completely beneath the unit.

Handling the unit with straps is not authorized.

WARNING

Risk of heavy unit falling over. Improper handling can cause equipment damage, injury or death.

Exercise extreme care when handling battery cabinets to avoid equipment damage or injury to personnel. The battery system cabinets weigh up to 3760 to 8990 lb. (1706 to 4078kg).

Locate center of gravity symbols and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.

Slots at the base of the module cabinets are intended for forklift use. Base slots will support the unit only if the forks are completely beneath the unit.

Read all of the following instructions before attempting to move, lift, or remove packaging from unit, or prepare unit for installation

AVERTISSEMENT

Le centre de gravité élevé de l'appareil présente un risque de renversement. Une mauvaise manutention peut entraîner des dommages matériels, des blessures et même la mort.

Faites preuve d'une extrême prudence lors de la manutention des armoires ASC afin d'éviter de les endommager ou de blesser le personnel. Le module ASC pèse jusqu'à 2 601kg (5 735lb).

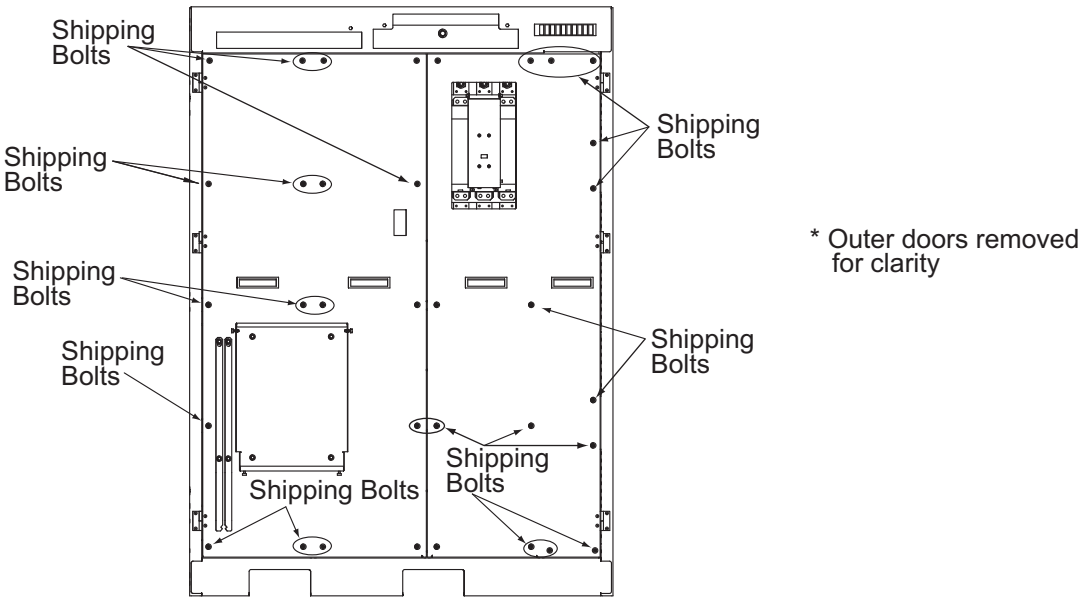
Identifiez les symboles de centre de gravité et déterminez le poids de l'appareil avant de manipuler chaque armoire. Testez le levage et l'équilibre des armoires avant de transporter l'appareil. Maintenez en tout temps l'inclinaison verticale minimale.

Les fentes situées à la base des armoires du module sont conçues pour utiliser le chariot élévateur. Les fentes situées à la base peuvent soutenir le système seulement si les fourches se trouvent complètement sous le système.

Lisez toutes les instructions ci-dessous avant de tenter de déplacer, lever, déballer ou préparer le système en vue de son installation.

The cabinet with top terminal batteries ships with extra bolts installed on the interior doors. Once the cabinet is in the final position, these bolts can be removed. See **Figure 1**

Figure 1 Shipping bolts—Top-Terminal Battery Cabinet



1.4.2 Clearances

Liebert *e*XL has no ventilation grilles at either side or at the rear of the battery system equipment. Clearance around the front of the equipment should be sufficient to enable free passage of personnel with the doors fully opened. It is important to leave a distance of 24" (610mm) between the top of the cabinet and the ceiling of the room in which it is installed to permit adequate circulation of air coming out of the unit and for service access.

1.4.3 Raised Floor Mounting

If the equipment is to be placed on a raised floor, it should be mounted on a pedestal suitably designed to accept the equipment point loading. Refer to the base view to design this pedestal.

1.5 System Composition

A battery system can consist of a number of equipment cabinets, depending on the individual system design requirements, e.g., Battery Cabinet, Junction Cabinet. Refer to **3.0 - Installation Drawings** for the positioning of the cabinets described below.

2.0 BATTERY INSTALLATION

2.1 Safety

Special care should be taken when working with the batteries associated with the Liebert *e*XL Battery System equipment. When all the cells are connected together, the battery terminal voltage will exceed 400V and is potentially lethal. A primary safety consideration is to install the battery equipment in an isolated area, accessible only to properly trained and qualified maintenance personnel.

WARNING

Risk of electrical shock and fire. Can cause equipment damage, personal injury or death.

Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

AVERTISSEMENT

Risque de décharge électrique et d'incendie. pouvant entraîner des dommages matériels, des blessures et même la mort.

Le remplacement des batteries doit être effectué ou supervisé par des membres du personnel dotés des compétences requises et connaissant les précautions à prendre. Le personnel non autorisé ne doit pas avoir accès aux batteries.

The following general battery safety precautions and warnings must be observed at all times:

- A battery can present risk of electric shock or burn from high short circuit currents.
- When connected in a string, the voltage will exceed 400VDC. This voltage is potentially lethal. Always observe high-voltage precautions.
- Eye protection must be worn to prevent injury from accidental electrical arcs.
- Remove rings, watches, necklaces, bracelets and all other metal objects.
- Use only tools with insulated handles.
- Wear appropriate personal protective equipment when handling batteries.
- If a battery leaks electrolyte or is otherwise physically damaged, it should be placed in a container resistant to wire and disposed of in accordance with local regulations.
- If electrolyte comes into contact with the skin, the affected area should be washed immediately with plenty of clean water.
- Batteries must always be disposed of according to local environmental laws.
- When replacing batteries, use the same number and type that were originally fitted.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine if the battery is grounded. If it is grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock.
- Battery support tray must be used whenever a battery tray is being pulled out.

2.2 Layout

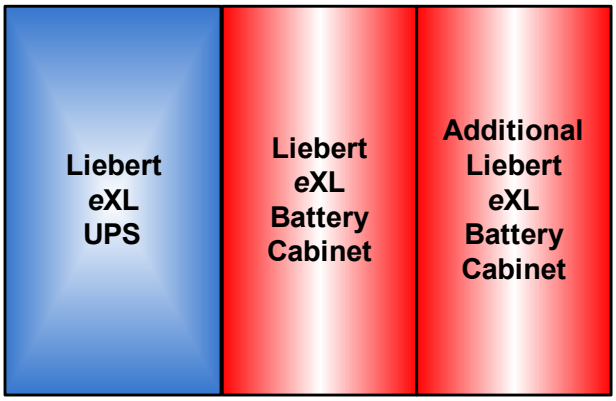
Depending on the site layout, the battery cabinets can be installed in any of several ways:

- **Connected**—Multiple battery cabinets bolted together
- **Stand-Alone**—Cabinet not bolted to Liebert *e*XL equipment
- **Attached**—Battery cabinets are bolted to a Liebert *e*XL UPS
- **Detached**—Battery cabinets are not bolted to a Liebert *e*XL UPS

See **Figures 2** through **4**.

Figure 2 Battery cabinets connected, attached to UPS

Battery cabinets may be mounted to the right of the UPS, but all cabling between the battery cabinets and the UPS must be external and performed by others.



If the battery cabinet system is ordered as left-side installation, cabling to connect the battery system to the UPS will be supplied. The cables will be routed internally.

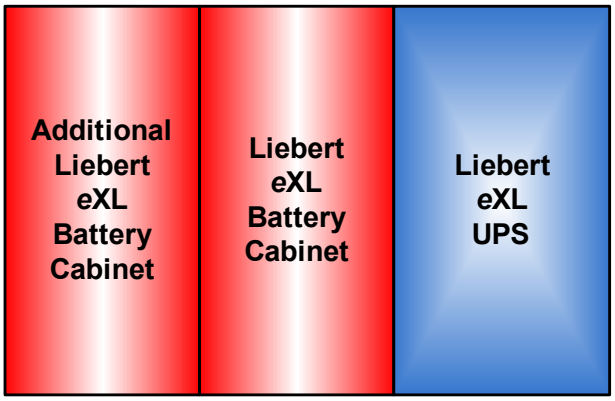


Figure 3 Battery cabinets connected, detached from UPS

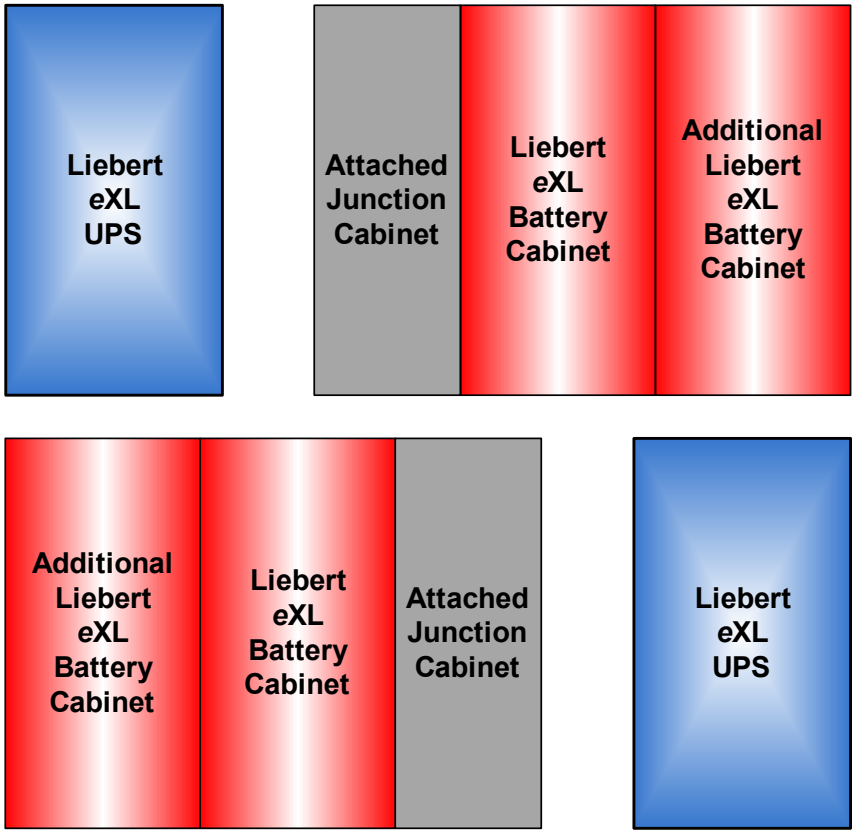
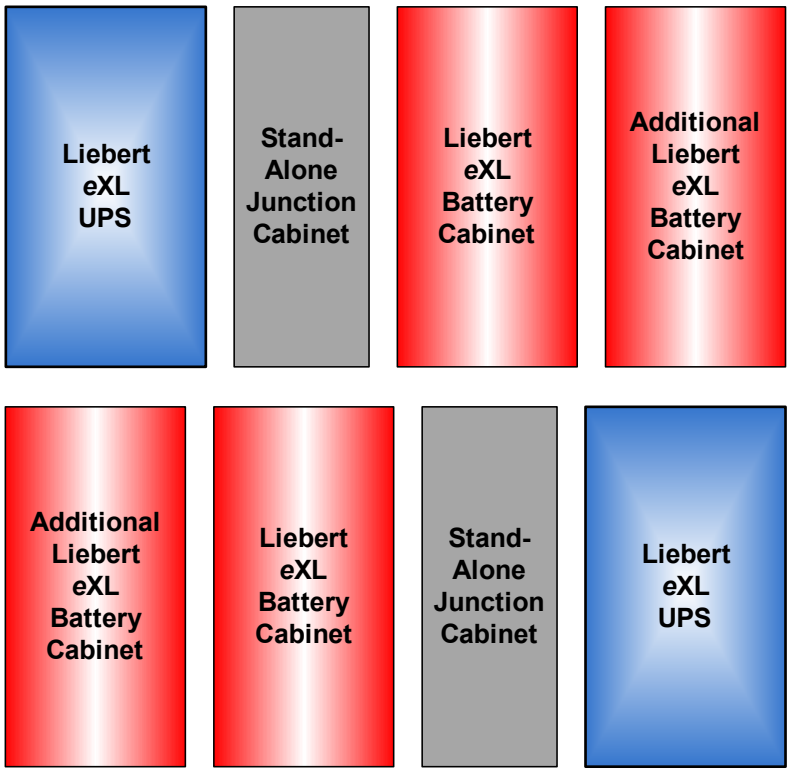


Figure 4 Stand-alone battery cabinets, detached from UPS

Maximum of eight battery cabinets. The junction cabinet provides sufficient conduit landing space and is required for all systems in this configuration.



2.3 Cable Entry

Cables may enter the battery cabinet from the top or bottom. Cable entry is made possible by installing conduit to the removable plate fitted at the top or bottom. See **3.0 - Installation Drawings**.

2.4 Power Connection

Depending on the site layout, the battery cabinets can be cabled several ways. See **Figures 2** through **4**.

CAUTION

Cables between batteries and the UPS should be run in matched pairs, positive-with-negative, within each conduit or cable run.

Grouping like-polarity cables together (i.e., positive-with-positive and negative-with-negative) can cause stress or damage to the cables, conduit or buswork

2.4.1 Connected System

For cabinets ordered as connected (battery cabinets will bolt to each other), the positive and negative busbars are connected between battery cabinets with the supplied busbar connector extensions. See **Figure 18**

2.4.2 Stand-Alone System

For cabinets that are ordered as stand-alone, customer must supply all the interconnecting cables and hardware. See **Table 9** for current ratings and recommended cable sizes.

2.4.3 Attached/Detached System

For battery cabinets that are connecting to a Liebert *e*XL UPS, (see **Figure 2**), cables will run from the positive and negative busbars of the adjacent battery cabinet to the positive and negative DC connections of UPS. For battery cabinets that are connecting to a Liebert *e*XL Junction Cabinet (see **Figure 3**), busbars will be connected from the positive and negative busbars of the adjacent battery cabinet to the positive and negative DC connections of Junction Cabinet.

For attached systems (the cabinets bolt to each other), the cables can run internal to the cabinets and will be supplied.

For detached systems (the cabinets do not bolt to each other), the cables must be run outside the cabinets. The customer must supply all the interconnecting cables and hardware. See **Table 9** for current ratings and recommended cable sizes.

2.4.4 Grounding

For cabinets that have been ordered as connected or attached, the ground cables and hardware will be supplied. See **Figure 19** for location of cabinet-to-cabinet grounding.

For cabinets ordered as detached or stand-alone, customer must supply the cables and hardware. See **Table 9** for current ratings and recommended cable sizes. See terminal detail drawings for location of ground busbar.

2.5 Control Connection

Each Liebert *e*XL Battery Cabinet contains a Battery Interface Board (BIB). See **3.0 - Installation Drawings**. All cabinets in a system must have their Battery Interface boards connected in series. See **Figure 10** for battery cabinet details

NOTE
Care must be taken to route the control cables away from high voltage cables or busbars.

Figure 5 Wiring external interface board in UPS to battery interface board in battery cabinet

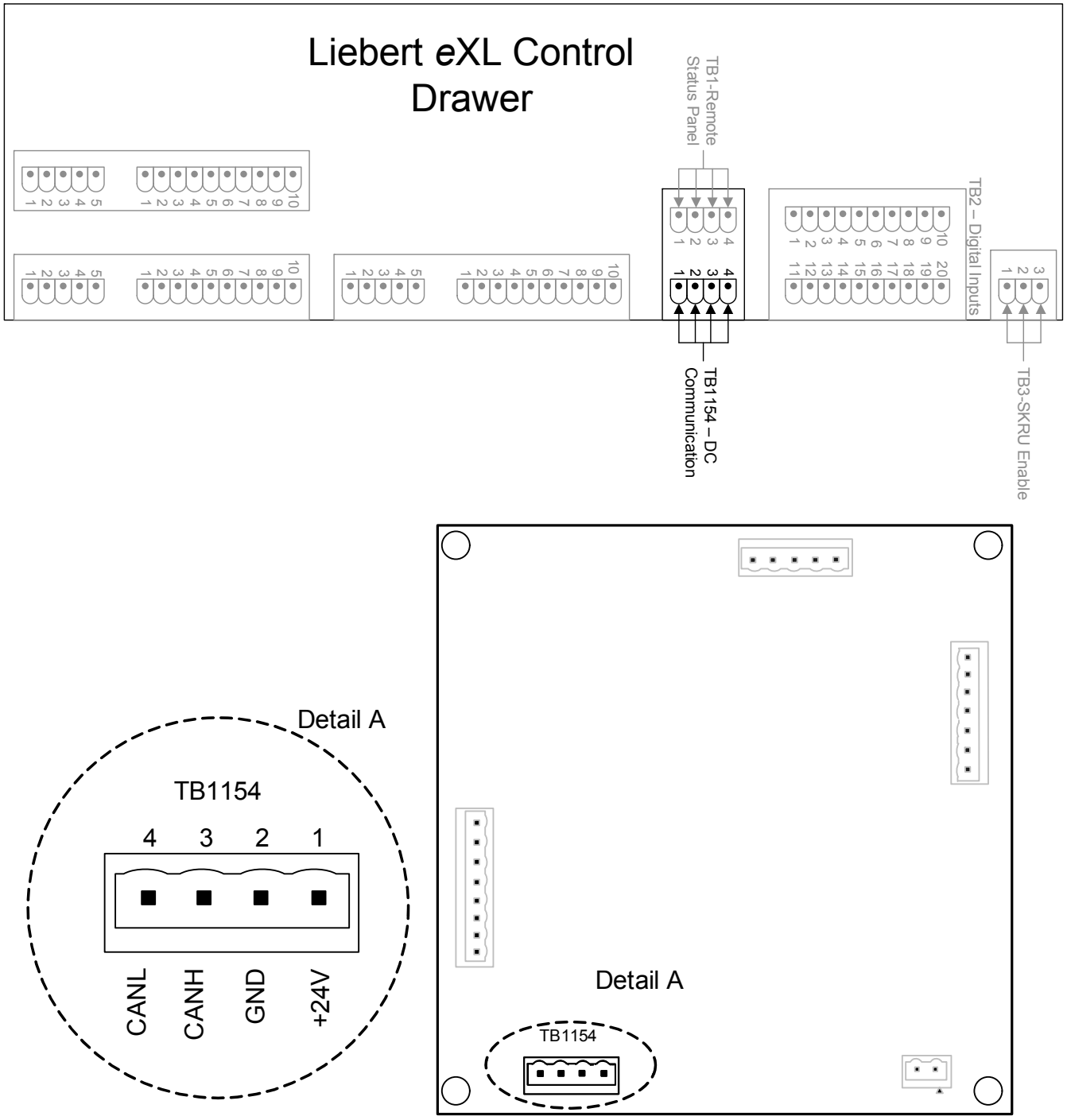
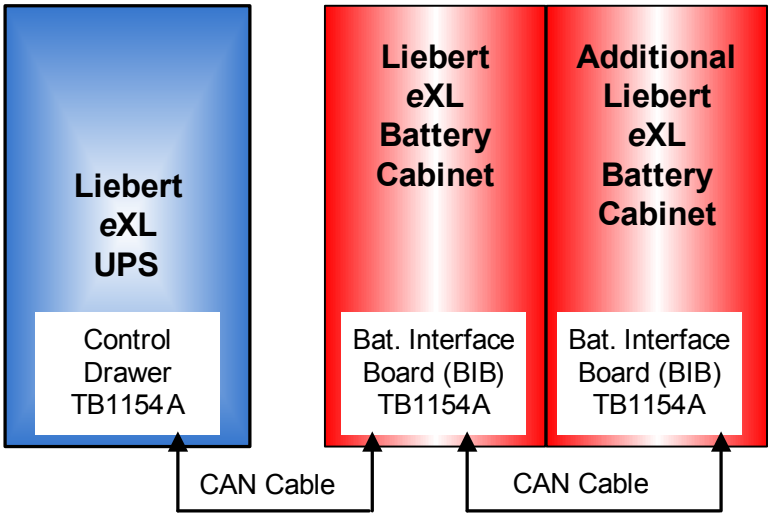


Figure 6 Control cable layout—Liebert eXL UPS to Liebert eXL Battery Cabinet



The CAN cables must be two, twisted pair, shielded 18AWG (Belden 9156 or equivalent). All interconnecting cables and hardware for connected and attached cabinets will be provided.

NOTICE

Risk of improper installation. Can cause equipment damage.

During system commissioning, Emerson® Network Power Liebert Services will set the jumpers on the EIB and the BIB. If another battery cabinet is added to the system after commissioning, it is imperative that Liebert Services reset the jumpers on the EIB board and the BIB board.

2.6 Alber Monitoring System—Optional

The Liebert matching battery cabinet allows installing an optional Alber battery monitoring system in the cabinet. The Alber battery monitoring continuously checks all critical battery parameters, such as cell voltage, overall string voltage, current and temperature. Automatic periodic tests of internal resistance of each battery will verify the battery's operating integrity. Additional capabilities include automatic internal DC resistance tests and trend analysis providing the ability to analyze performance and aid in troubleshooting.

The Alber monitoring system is installed inside the battery cabinet (see **Figure 23**). The monitoring system requires approximately 0.5A, single-phase power.

This power can come from the output of the UPS the battery cabinet is supplying (see **Figure 23**).

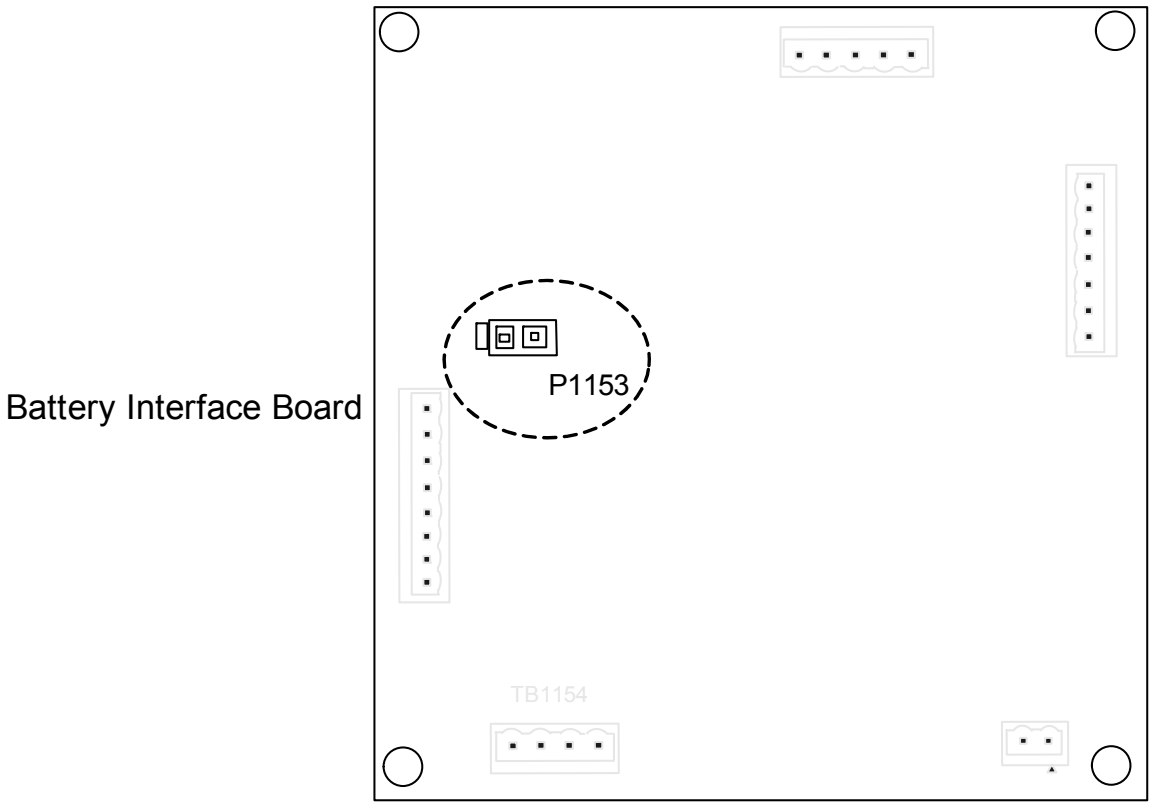
The Alber monitoring system consists of a Controller Module and Data Collector Module (see **Figure 21**). One Controller Module can monitor up to six battery cabinets with a Data Collector Module installed. The battery cabinet with the Controller Module (Battery Cabinet #1) must be installed in the position closest to the UPS.

For details about operating the Alber system, see the Alber Monitoring System manual, available at the Liebert Web Site, **www.liebert.com**

2.7 External Battery Room Temperature Sensor—Optional

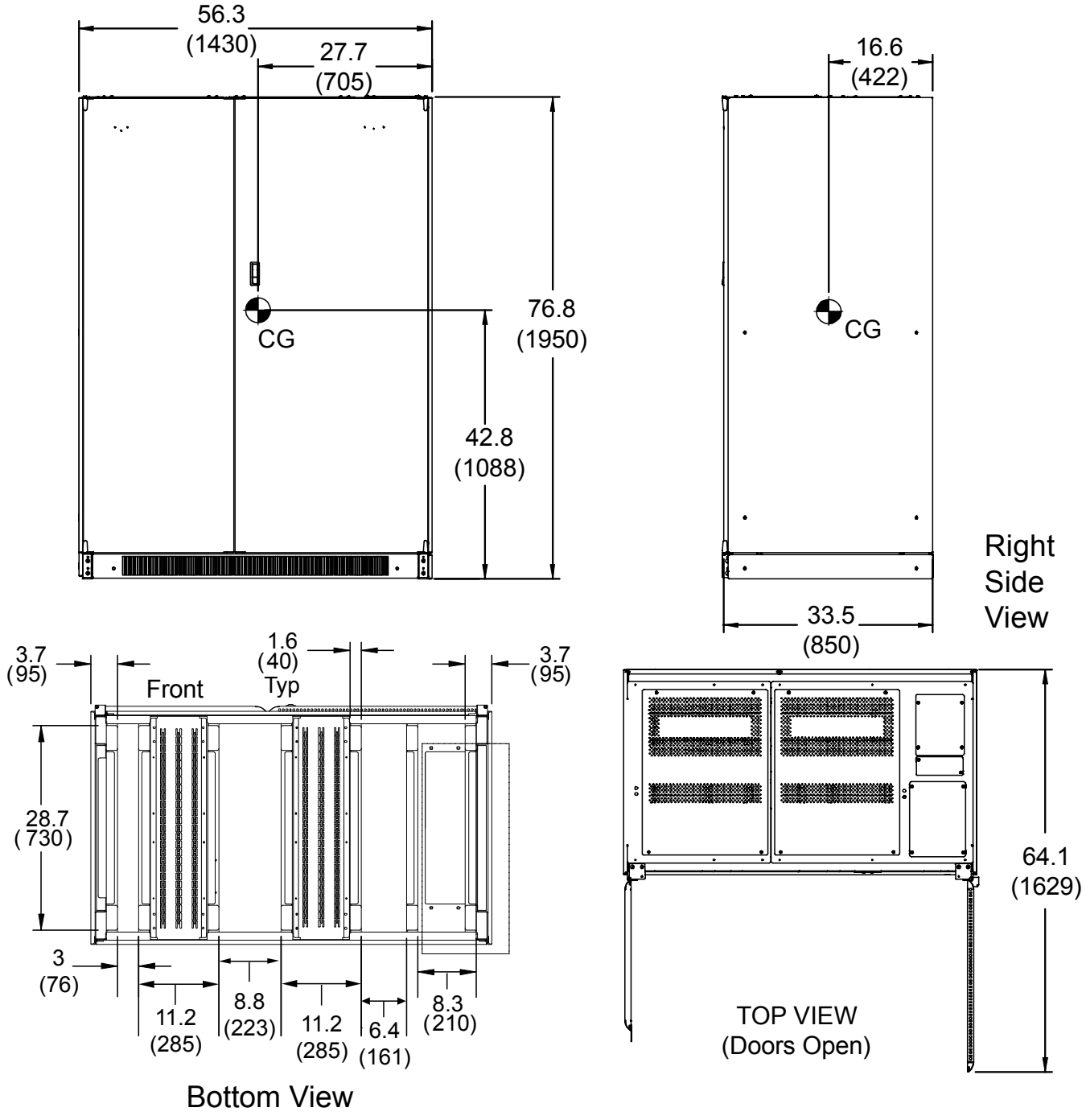
For systems that do not use Liebert *e*XL Battery Cabinets, an optional temperature sensor can be installed to monitor the ambient room temperature. This sensor is connected to the BIB board (see **Figure 7**). This sensor will allow the Liebert *e*XL UPS to perform temperature compensation charging.

Figure 7 Battery temperature sensor control connection



3.0 INSTALLATION DRAWINGS

Figure 8 Outline drawing, Liebert Top-Terminal Battery Cabinet



NOTE:
1. All dimensions are in in. (mm)
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
5. Widths are with side panels. The width is 55.1" (1400mm) without side panels.
6.The depth dimension includes the front door and rear panel.

Figure 9 Main components, Liebert Top-Terminal Battery Cabinet

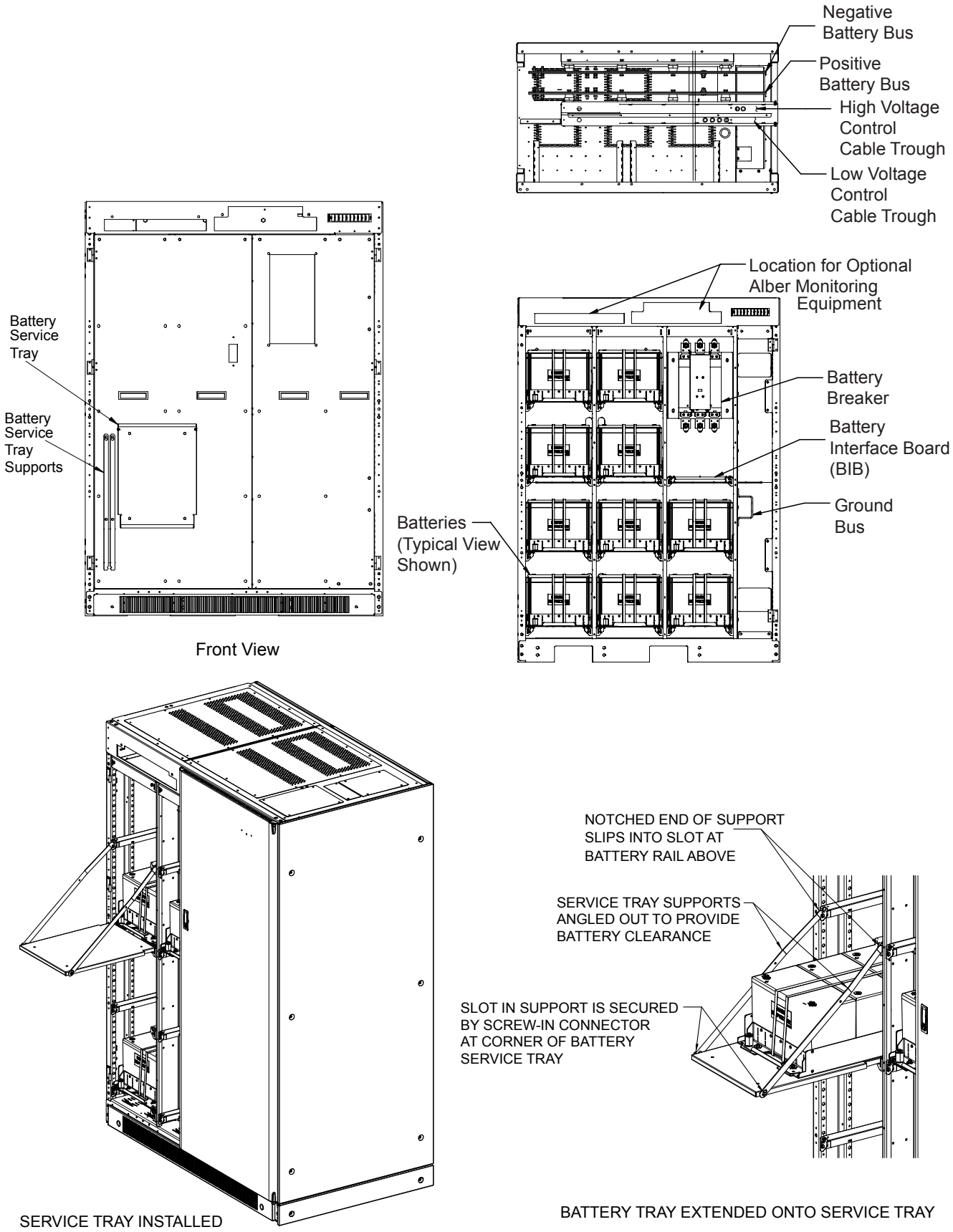
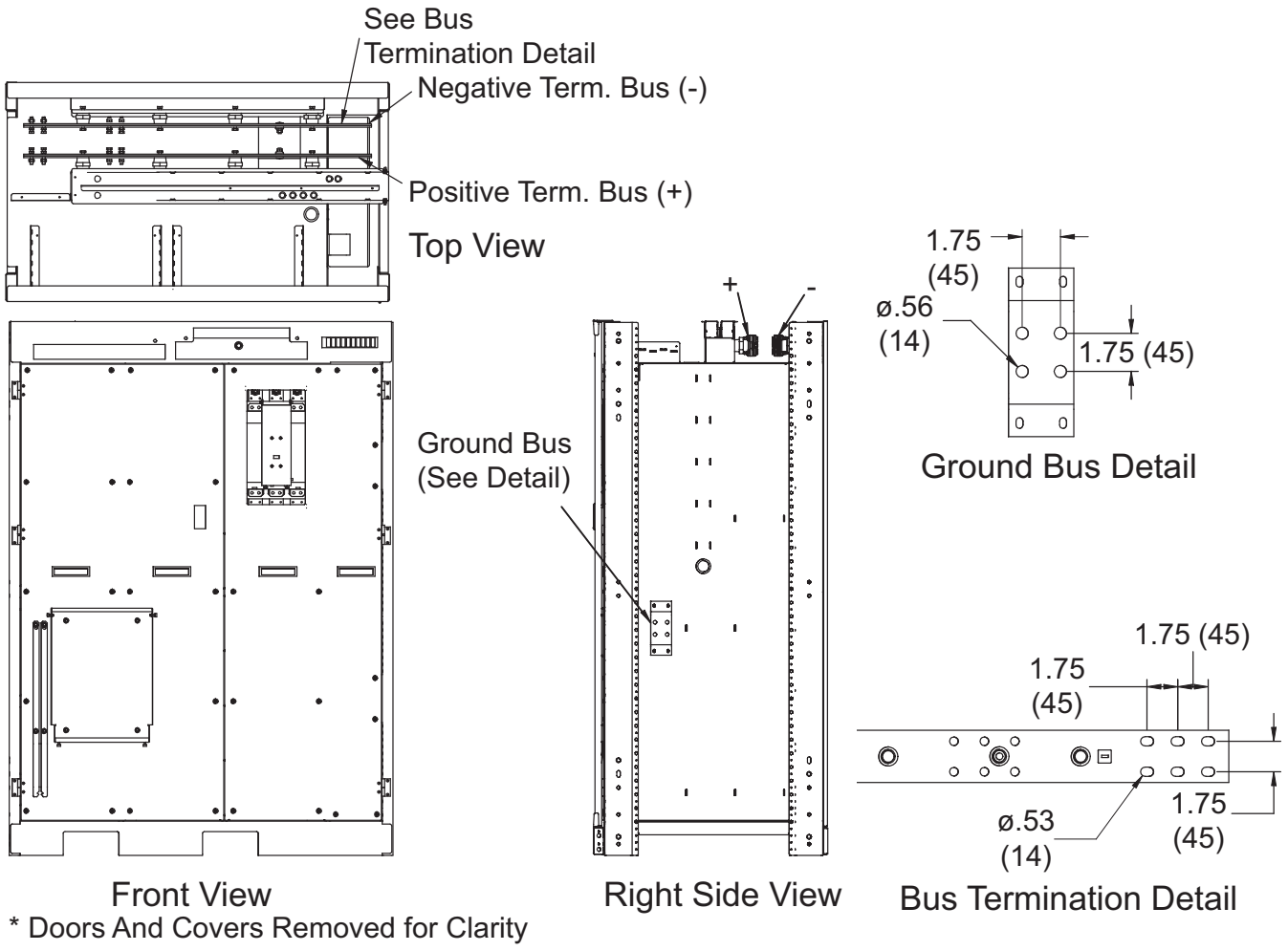

Negative Battery Bus
Positive Battery Bus
High Voltage Control Cable Trough
Low Voltage Control Cable Trough
Battery Service Tray
Battery Service Tray Supports
Front View
Location for Optional Alber Monitoring Equipment
Battery Breaker
Battery Interface Board (BIB)
Ground Bus
Batteries (Typical View Shown)
SERVICE TRAY INSTALLED
NOTCHED END OF SUPPORT SLIPS INTO SLOT AT BATTERY RAIL ABOVE
SERVICE TRAY SUPPORTS ANGLED OUT TO PROVIDE BATTERY CLEARANCE
SLOT IN SUPPORT IS SECURED BY SCREW-IN CONNECTOR AT CORNER OF BATTERY SERVICE TRAY
BATTERY TRAY EXTENDED ONTO SERVICE TRAY

Figure 10 Terminal details, Liebert Top-Terminal Battery Cabinet



Notes

1. All dimensions are in inches (mm)
2. Top and bottom cable entry available through removable access plates.
3. Control wiring and power wiring must be run in separate conduit.
4. Unless otherwise noted, use copper or aluminum conductors suitable for at least 75°C.
5. All wiring must be in accordance with national and local electrical codes.
6. For cabinets ordered as stand-alone, the negative and positive terminal bus does not extend to full width of battery cabinet.
7. 24" minimum clearance above unit is required for air exhaust and service access.

Figure 11 Front Terminal Battery Cabinet shipping split

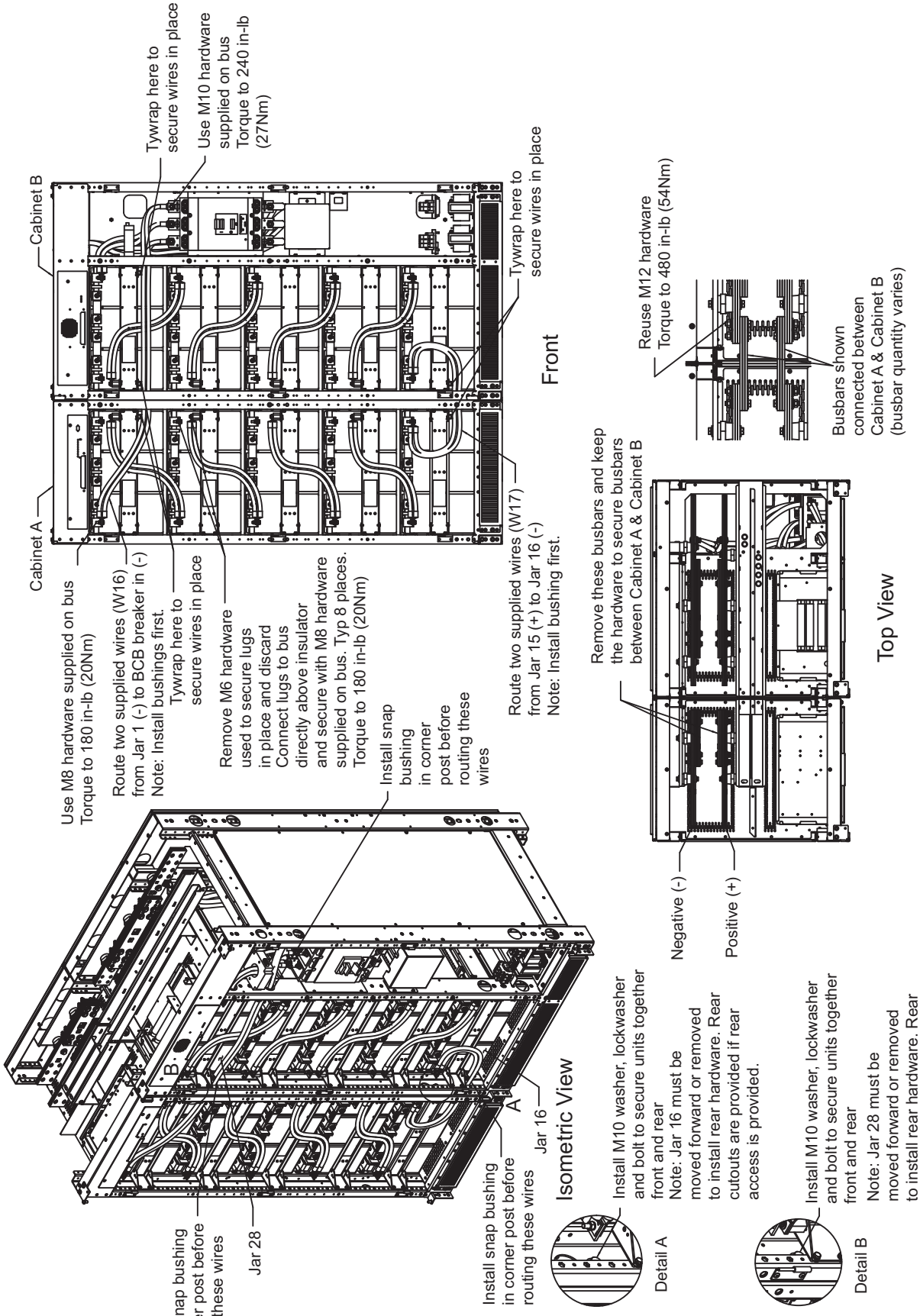

Cabinet B
Tywrap here to secure wires in place
Use M10 hardware supplied on bus Torque to 240 in-lb (27Nm)
Tywrap here to secure wires in place
Cabinet A
Use M8 hardware supplied on bus Torque to 180 in-lb (20Nm)
Route two supplied wires (W16) from Jar 1 (-) to BCB breaker in (-) Note: Install bushings first.
Tywrap here to secure wires in place
Remove M6 hardware used to secure lugs in place and discard Connect lugs to bus directly above insulator and secure with M8 hardware supplied on bus. Typ 8 places. Torque to 180 in-lb (20Nm)
Install snap bushing in corner post before routing these wires
Route two supplied wires (W17) from Jar 15 (+) to Jar 16 (-) Note: Install bushing first.
Front
Reuse M12 hardware Torque to 480 in-lb (54Nm)
Busbars shown connected between Cabinet A & Cabinet B (busbar quantity varies)
Remove these busbars and keep the hardware to secure busbars between Cabinet A & Cabinet B
Top View
Negative (-)
Positive (+)
Install snap bushing in corner post before routing these wires
Jar 28
Install snap bushing in corner post before routing these wires
Jar 16
Isometric View
Install M10 washer, lockwasher and bolt to secure units together front and rear Note: Jar 16 must be moved forward or removed to install rear hardware. Rear cutouts are provided if rear access is provided.
Detail A
Install M10 washer, lockwasher and bolt to secure units together front and rear Note: Jar 28 must be moved forward or removed to install rear hardware. Rear cutouts are provided if rear access is provided.
Detail B

Figure 12 Front Terminal Battery Cabinet outline drawing

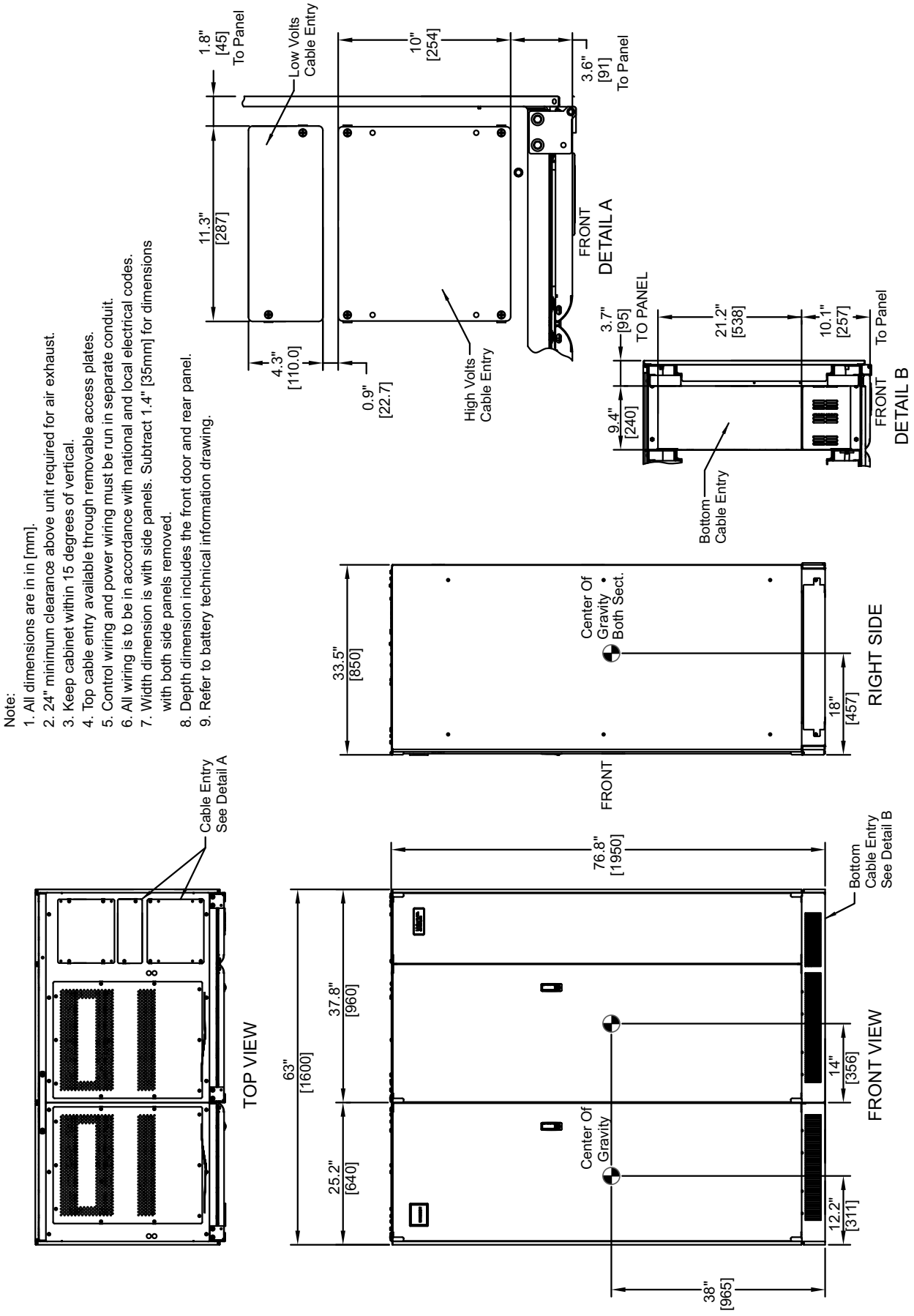

Note:
1. All dimensions are in in [mm].
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top cable entry available through removable access plates.
5. Control wiring and power wiring must be run in separate conduit.
6. All wiring is to be in accordance with national and local electrical codes.
7. Width dimension is with side panels. Subtract 1.4" [35mm] for dimensions with both side panels removed.
8. Depth dimension includes the front door and rear panel.
9. Refer to battery technical information drawing.
1.8" [45] To Panel
Low Volts Cable Entry
10" [254]
3.6" [91] To Panel
11.3" [287]
4.3" [110.0]
0.9" [22.7]
High Volts Cable Entry
FRONT
DETAIL A
3.7" [95] TO PANEL
21.2" [538]
10.1" [257]
To Panel
9.4" [240]
FRONT
DETAIL B
Bottom Cable Entry
33.5" [850]
Center Of Gravity • Both Sect.
18" [457]
RIGHT SIDE
FRONT
Cable Entry See Detail A
TOP VIEW
76.8" [1950]
Bottom Cable Entry See Detail B
63" [1600]
37.8" [960]
25.2" [640]
Center Of Gravity
14" [356]
12.2" [311]
FRONT VIEW
38" [965]

Figure 13 Front Terminal Battery Cabinet main components, layout

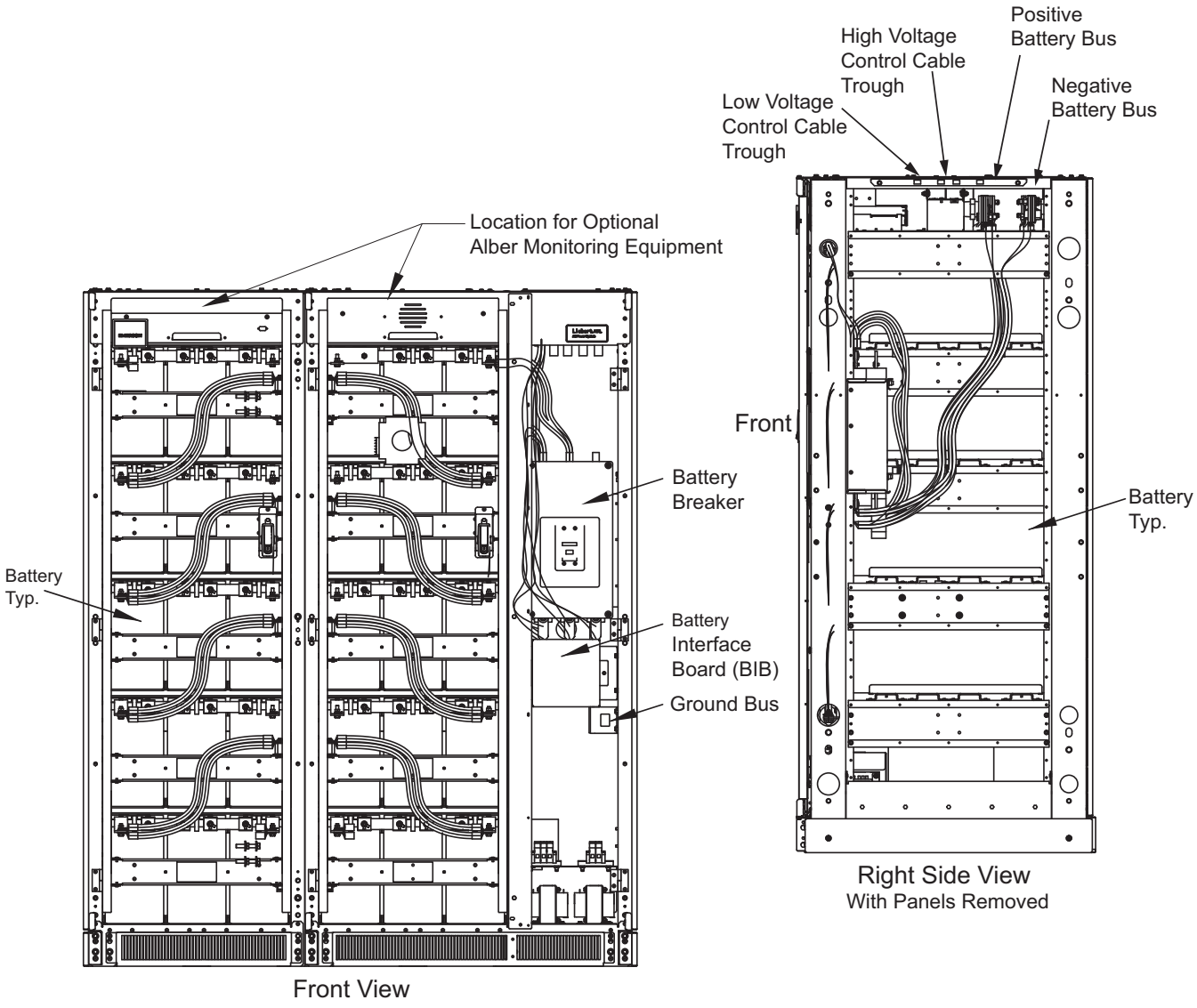
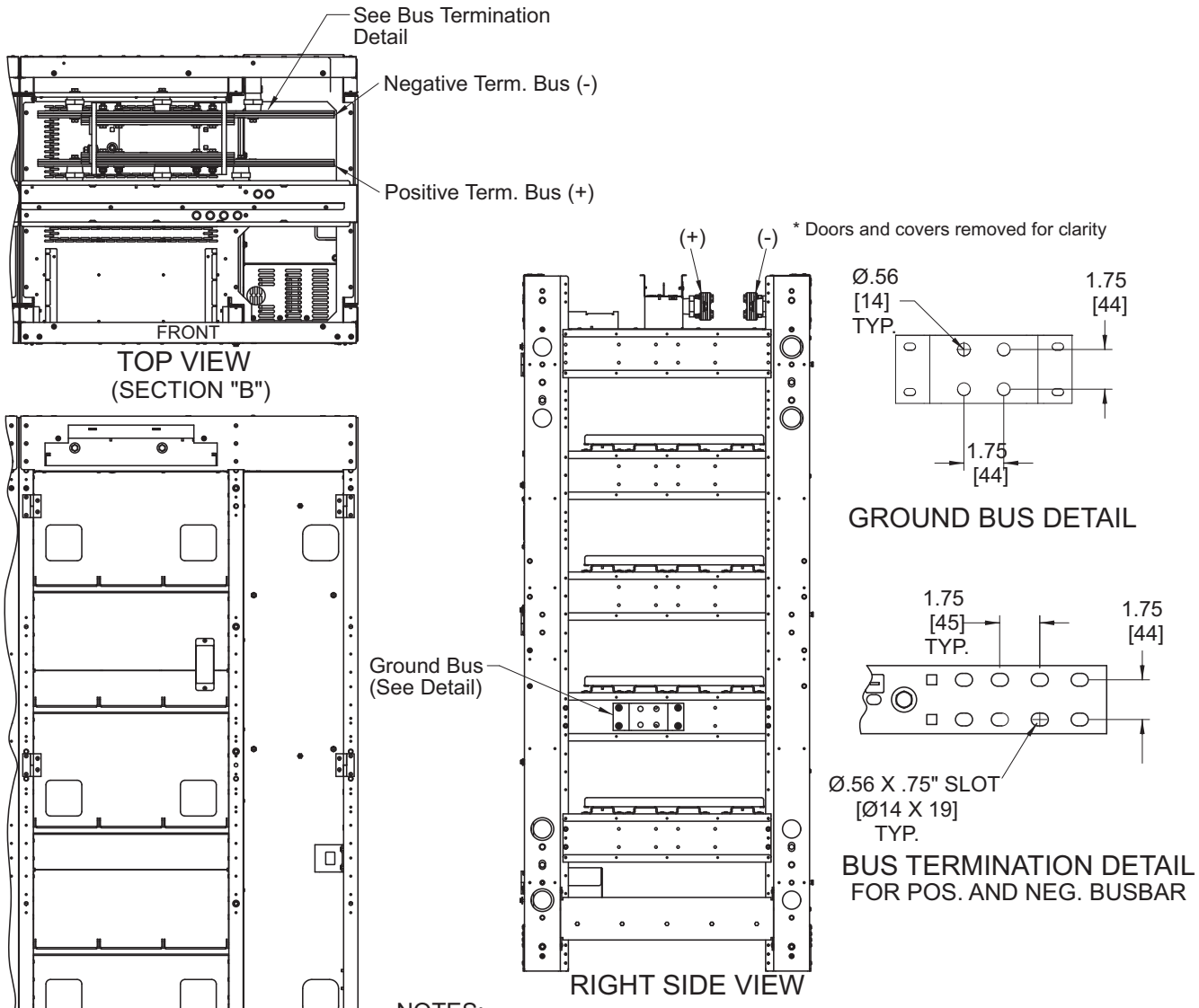


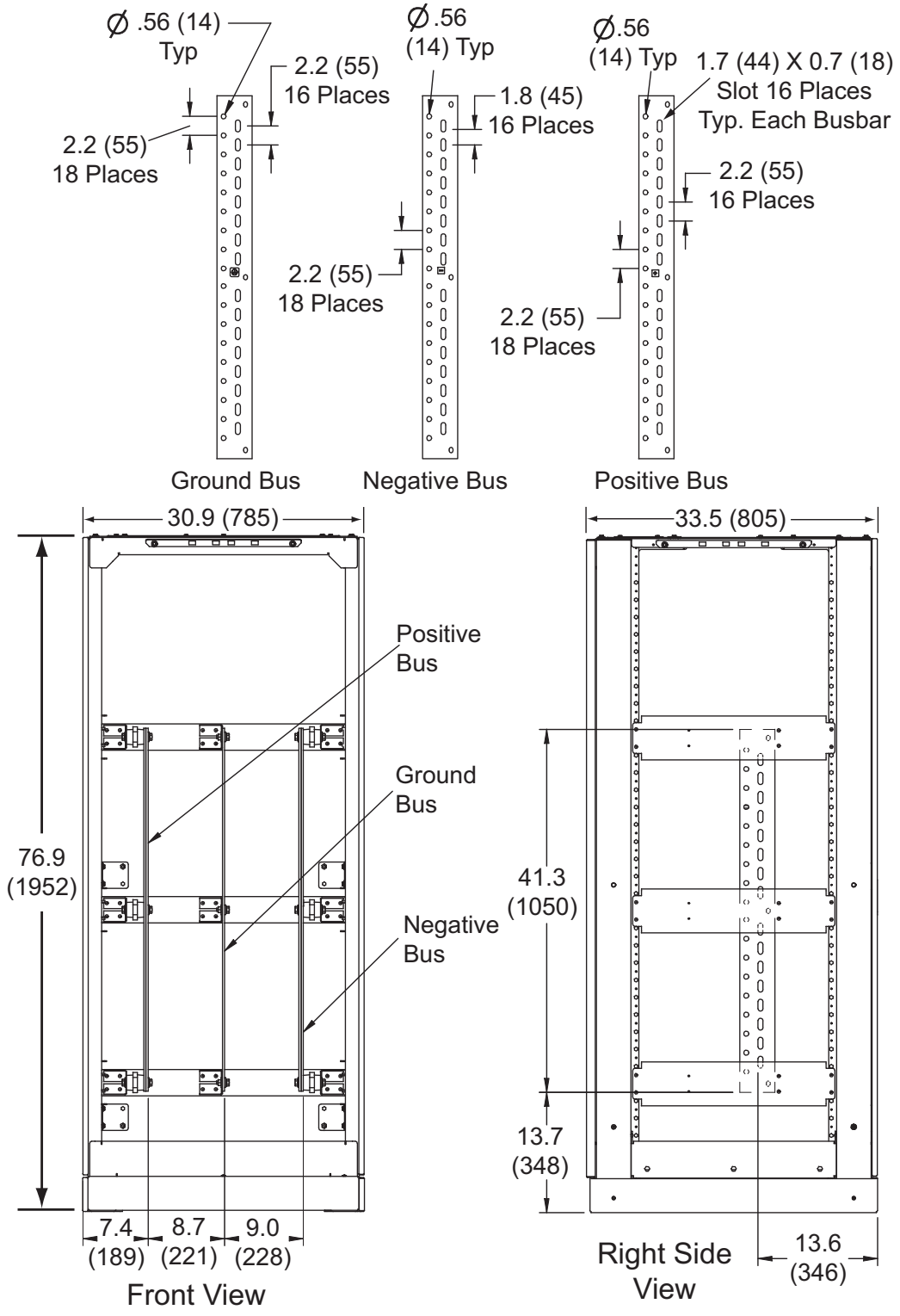
Figure 14 Front terminal detail drawing



NOTES:

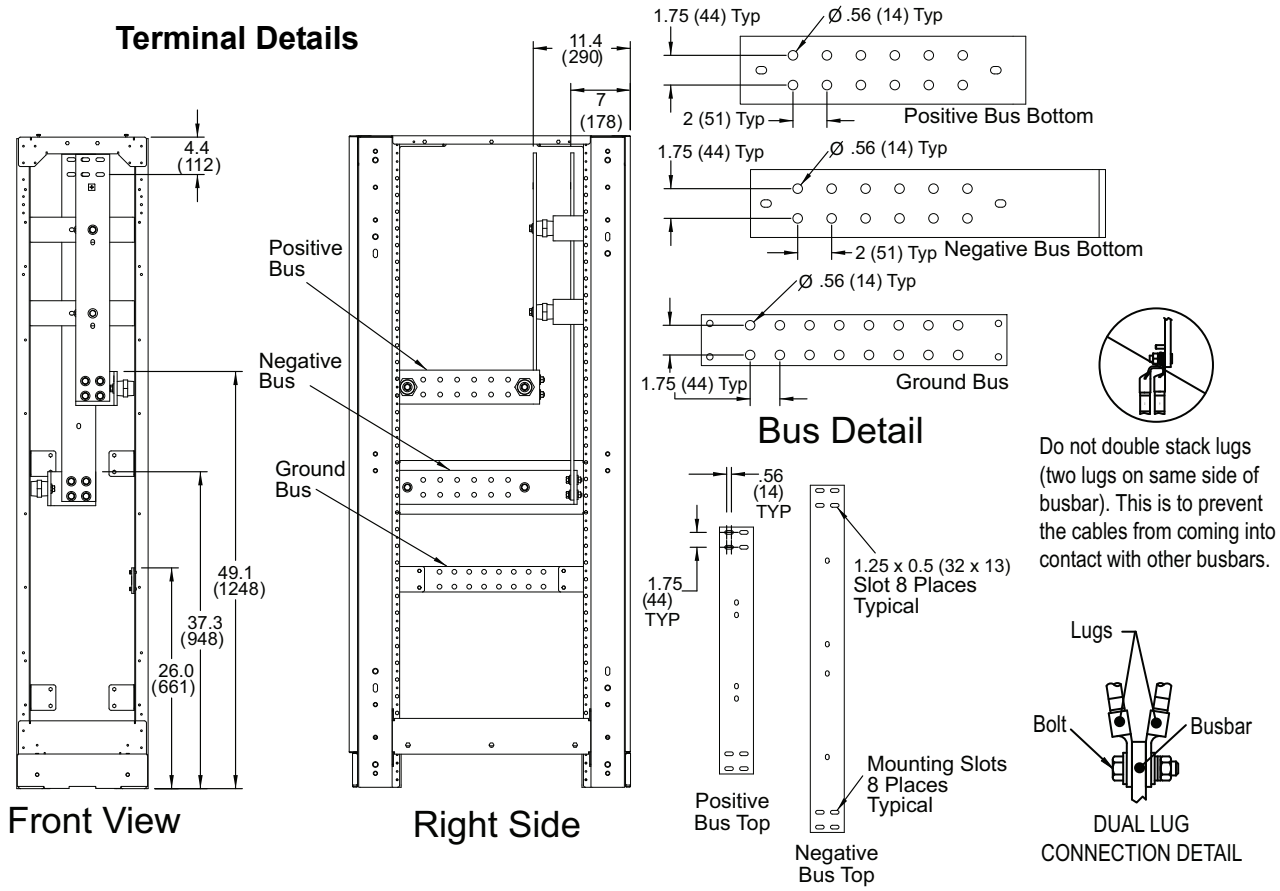
1. All dimensions are in in [mm].
2. Top and bottom cable entry available through removable access plates.
3. Control wiring and power wiring must be run in separate conduit.
4. Unless otherwise noted, use copper or aluminum conductors suitable for at least 75°C.
5. All wiring is to be in accordance with national and local electrical codes.
6. For cabinets ordered as stand-alone, the negative and positive terminal bus does not extend to full width of battery cabinet.
7. 24" minimum clearance above unit is required for air exhaust and service.

Figure 15 Liebert eXL Stand-Alone Junction Cabinet terminal wiring

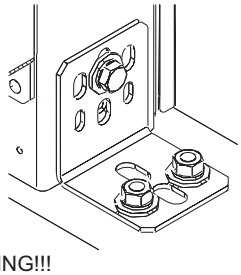


Notes:
1. All dimensions are in inches (mm).
2. Control wiring and power wiring must be run in separate conduit.
3. Unless otherwise noted, use copper or aluminum conductors suitable for at least 75°C.
4. Widths are without side panels. The width is 32.1" (815mm) with side panels.
5. The depth dimension includes the front door and rear panel.

Figure 16 Liebert eXL Attached Junction Cabinet—terminal detail and outline drawing



Outline Drawing



WARNING!!!
Unit Removal and Unit Mobility Instructions Brackets MUST remain attached to the frame until such time that the unit is being located in its final installed position. (The final installation will always require the unit to be bolted to another Liebert eXL product.)
Failure to comply with these instructions could result in equipment damage and/or injury to personnel

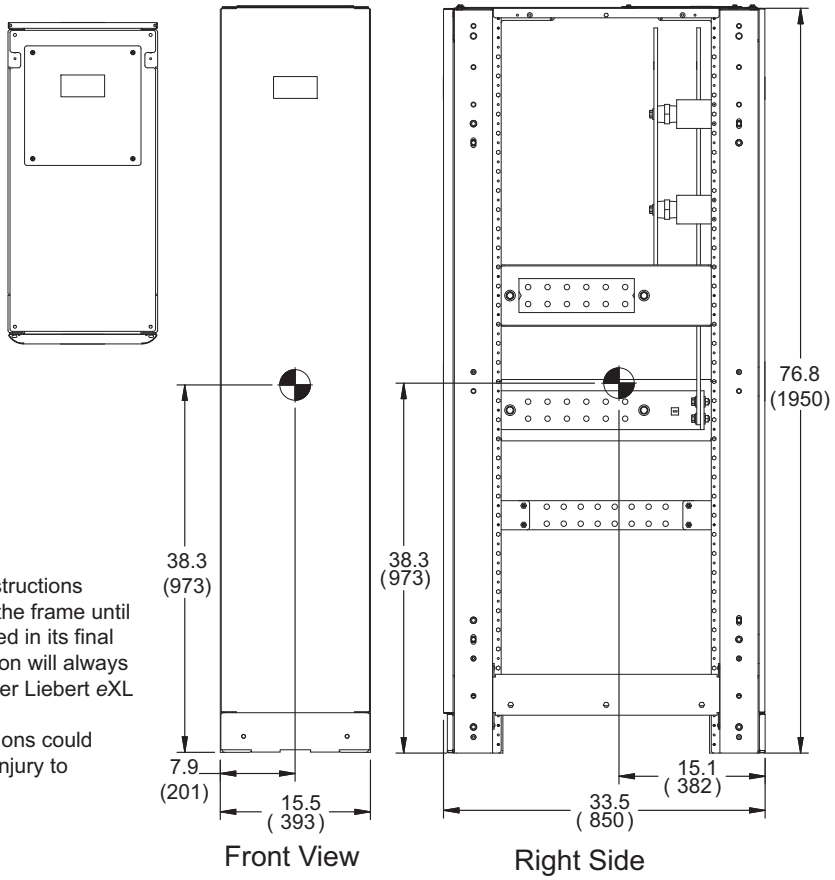


Figure 17 Liebert eXL Battery Cabinet control wiring

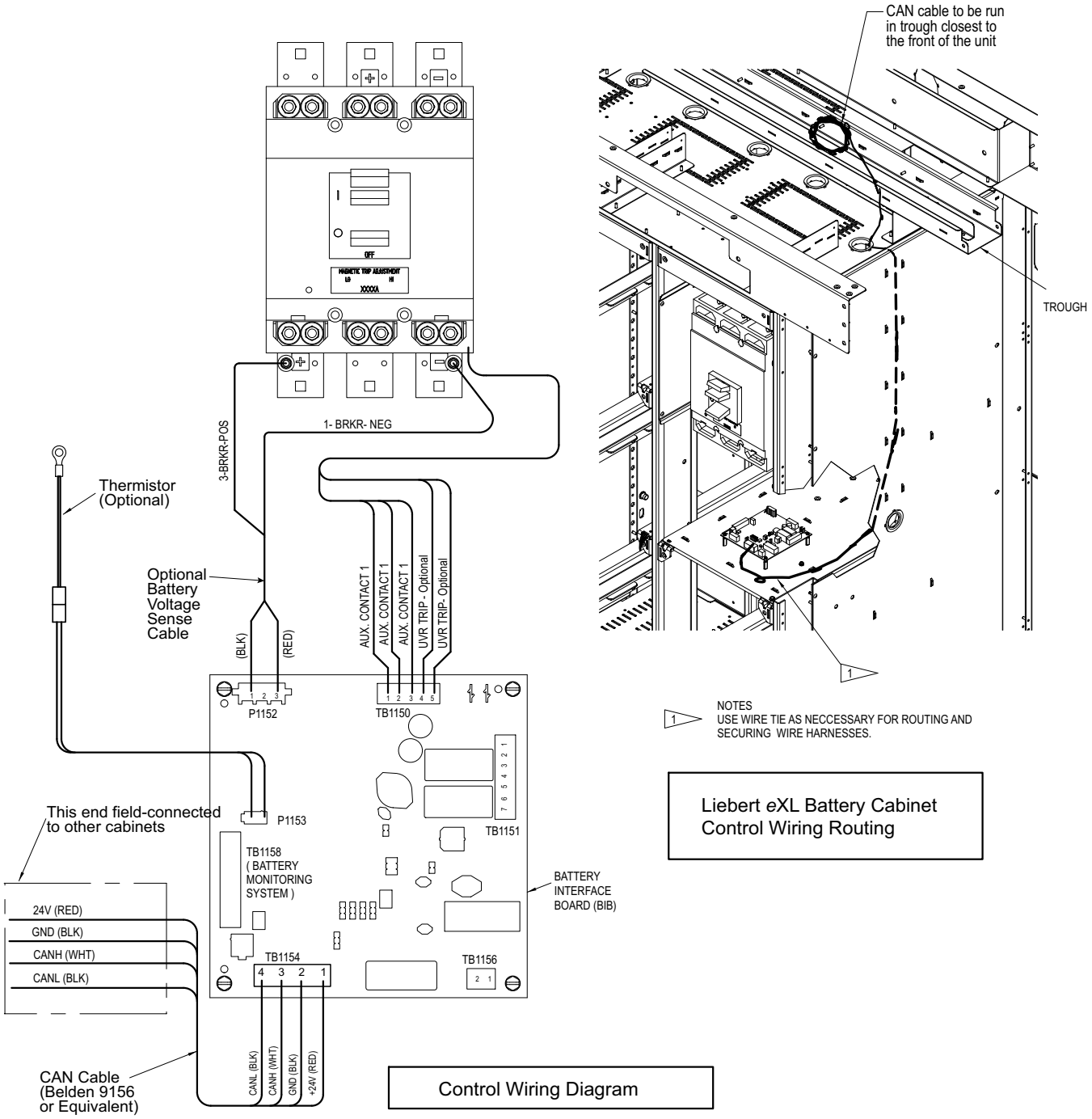


Figure 18 Attached battery cabinet connections

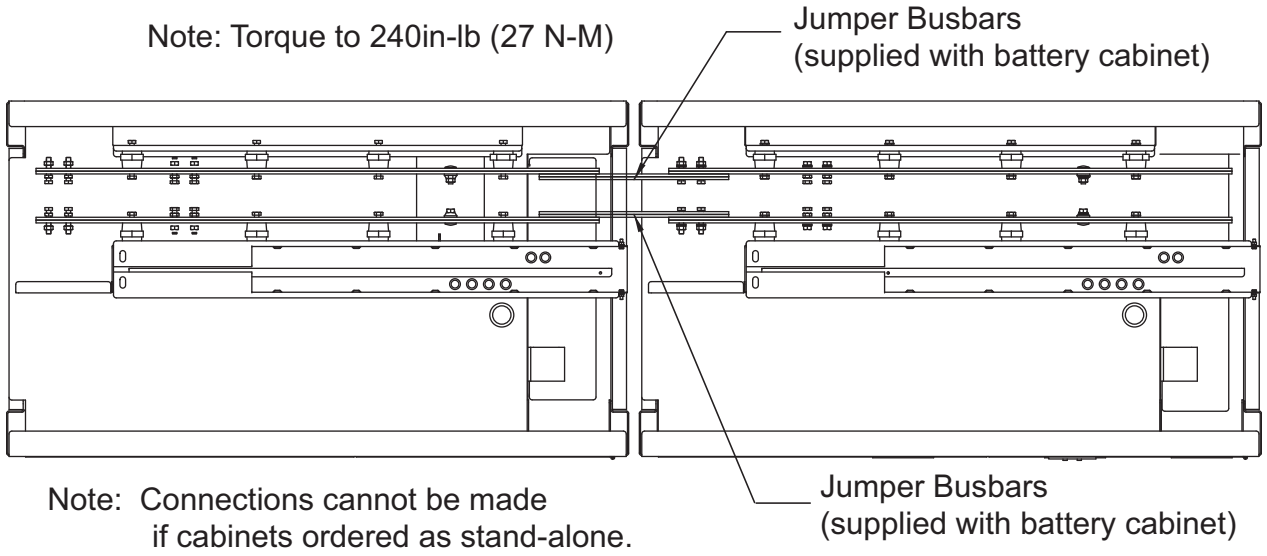
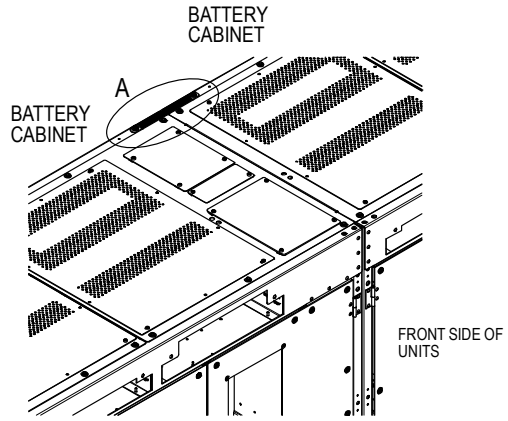
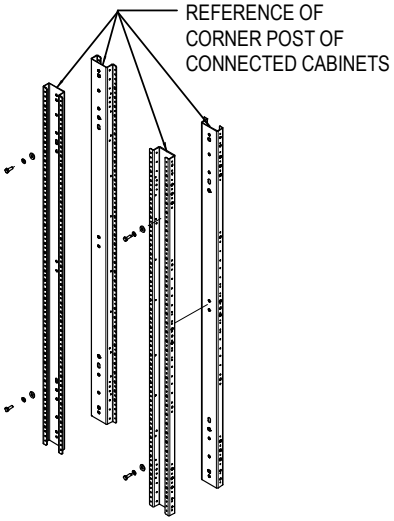

Note: Torque to 240in-lb (27 N-M)
Jumper Busbars
(supplied with battery cabinet)
Jumper Busbars
(supplied with battery cabinet)
Note: Connections cannot be made
if cabinets ordered as stand-alone.

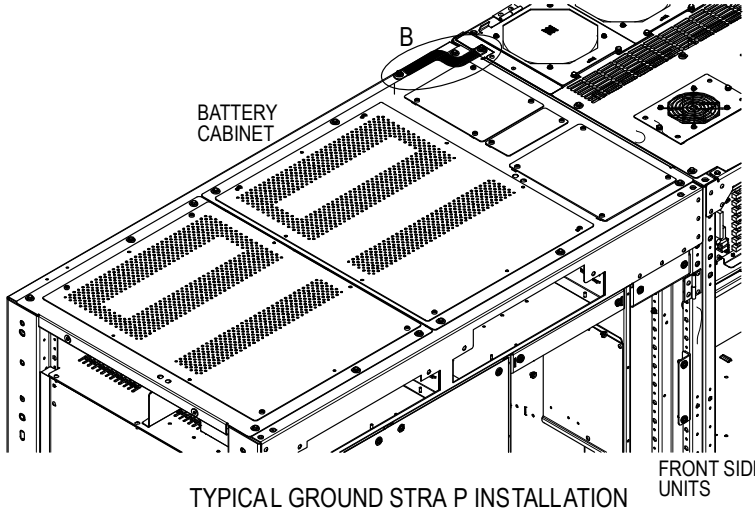
Figure 19 Ground strap location for connected cabinets



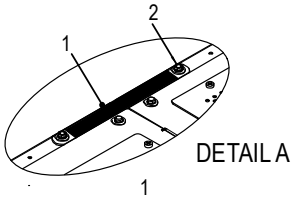
TYPICAL GROUND STRAP INSTALLATION
FOR BATTERY CABINET TO BATTERY CABINET
CONNECTIONS



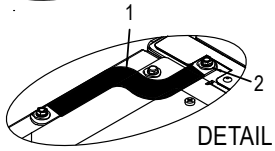
CABINET-TO-CABINET
BOLTING INSTRUCTIONS



TYPICAL GROUND STRAP INSTALLATION
FOR BATTERY CABINET TO
UPS OR ANCILLARY CABINET CONNECTIONS



DETAIL A



DETAIL B

NOTES:
1. Apply ground strap hardware to specified locations.
2. Torque Values: M6: (5 Nm) 40 IN-LB
M10: (14 Nm) 120 IN-LB

Figure 20 Liebert eXL Top-Terminal Battery Cabinet interconnect wiring to Liebert eXL Stand-Alone Junction Cabinet

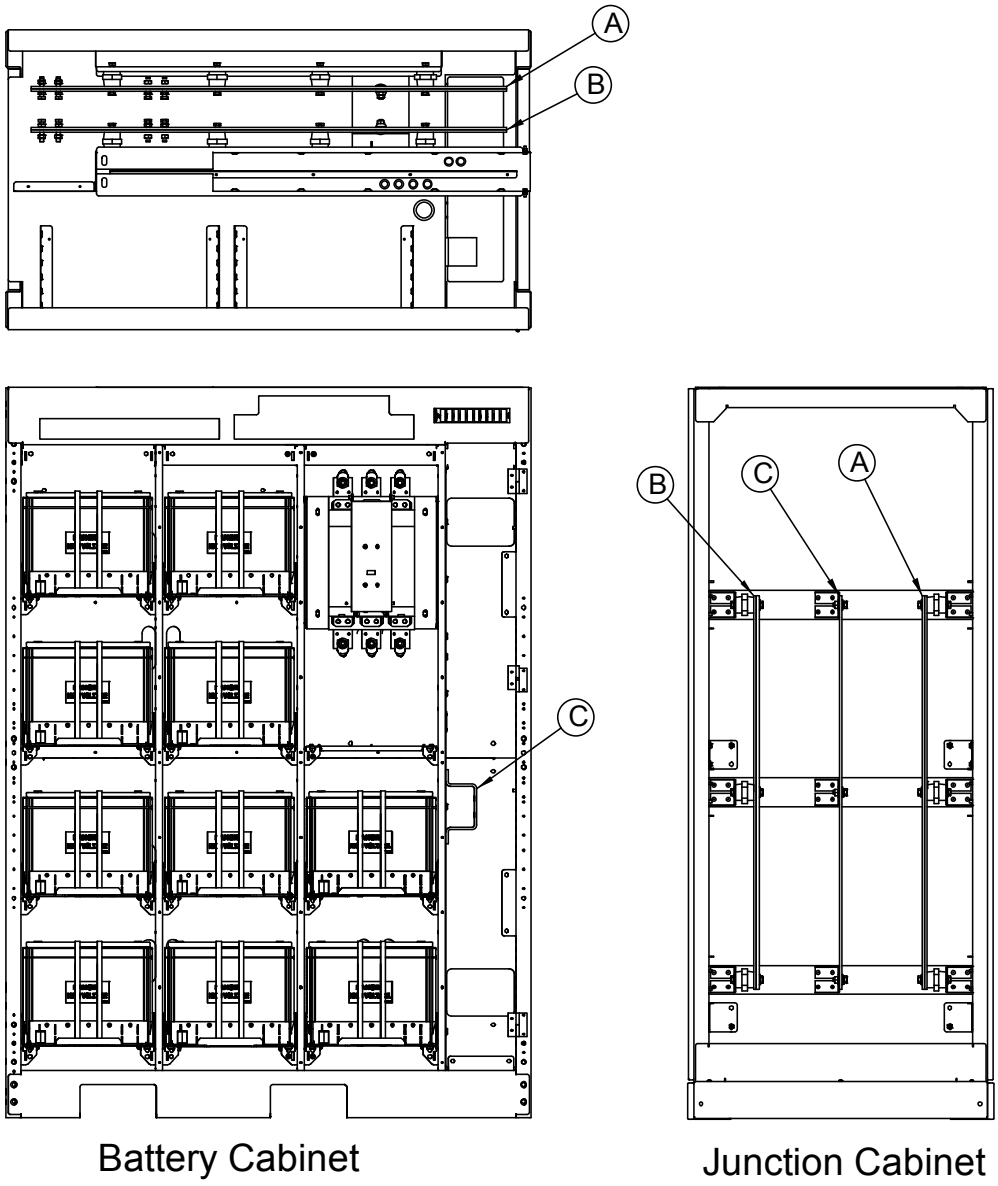


Table 1 Liebert eXL Top-Terminal Battery Cabinet interconnect wiring to Liebert eXL Junction Cabinet

Run	From	To	Conductors
A	Battery Cabinet Negative Bus	Junction Negative Bus	Negative DC Power
B	Battery Cabinet Positive Bus	Junction Positive Bus	Positive DC Power
C	Battery Cabinet Ground	Junction Ground	Ground

Figure 21 Typical Alber battery monitoring connections

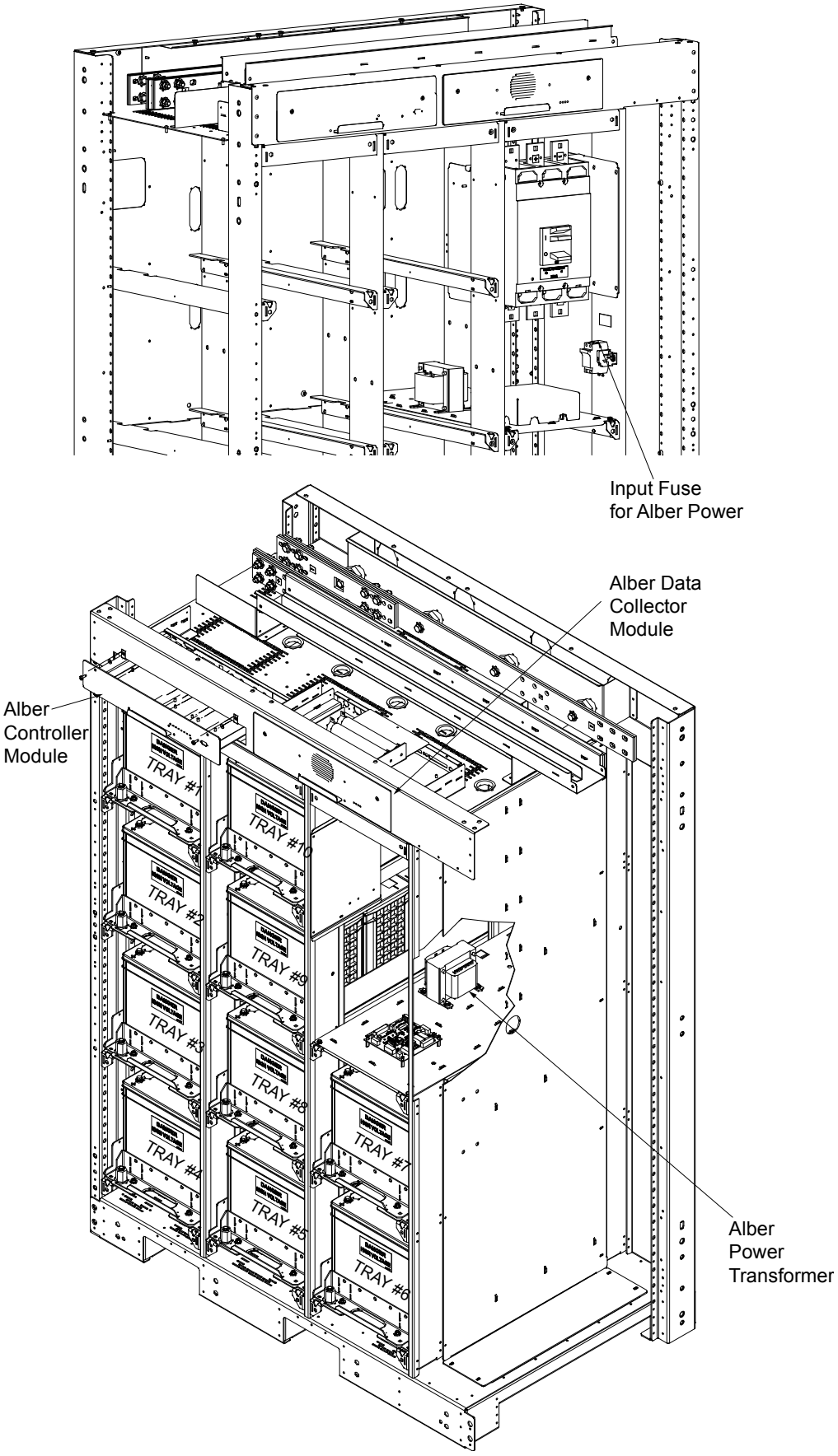


Figure 22 Alber battery monitoring wiring to multiple battery cabinets

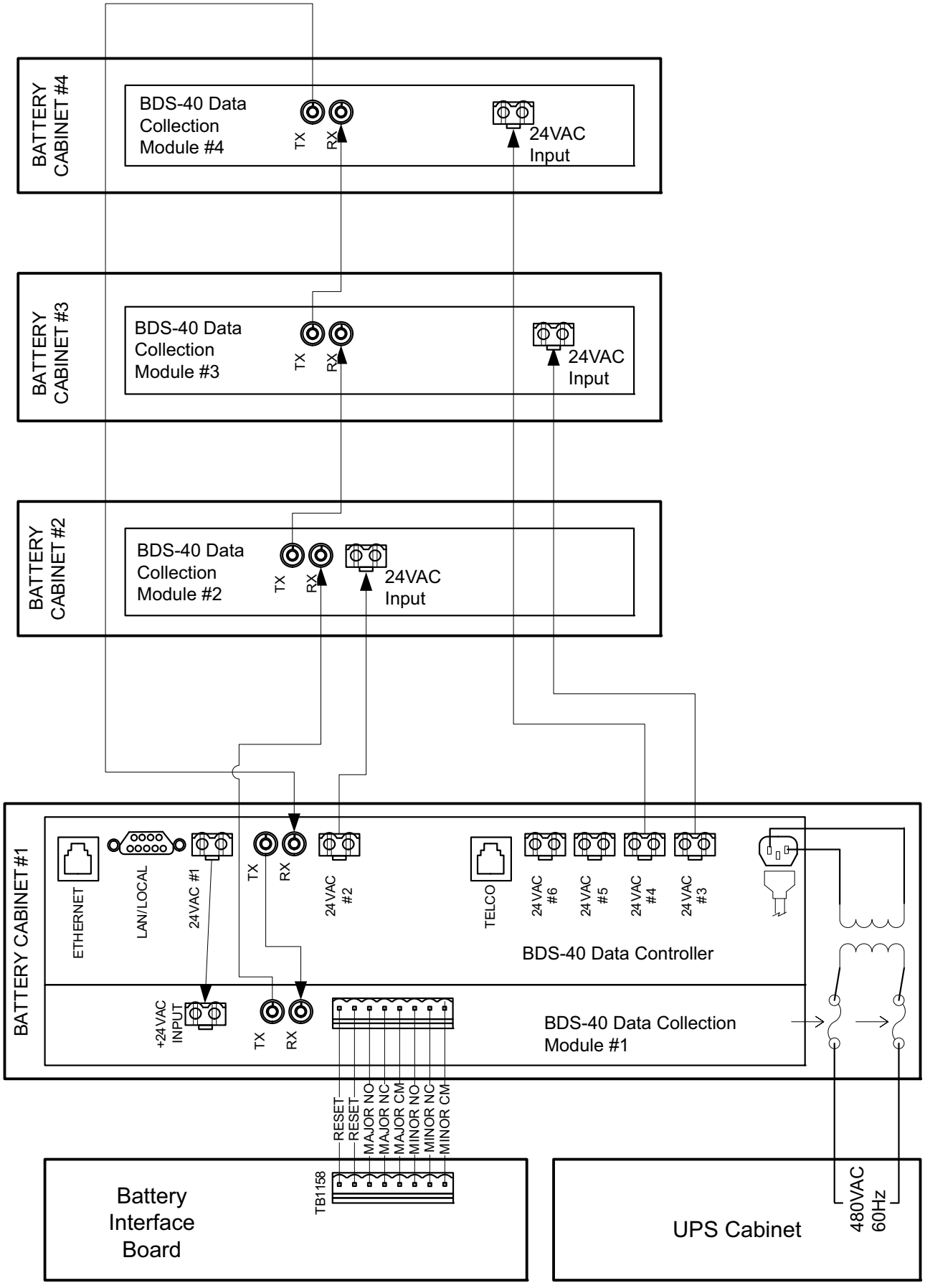


Figure 23 Alber battery monitoring assembly diagram

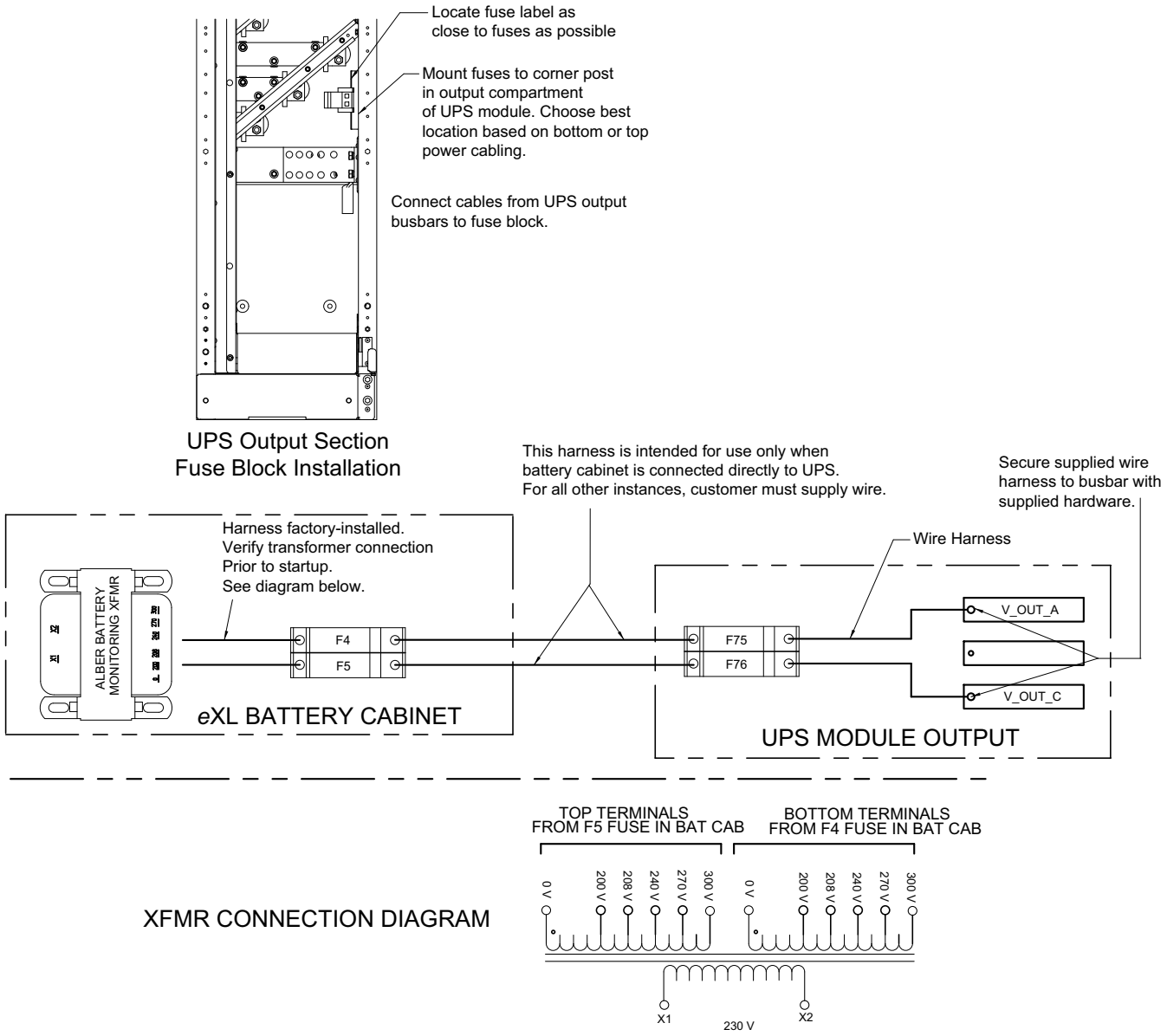

Locate fuse label as close to fuses as possible
Mount fuses to corner post in output compartment of UPS module. Choose best location based on bottom or top power cabling.
Connect cables from UPS output busbars to fuse block.
UPS Output Section
Fuse Block Installation
This harness is intended for use only when battery cabinet is connected directly to UPS.
For all other instances, customer must supply wire.
Secure supplied wire harness to busbar with supplied hardware.
Harness factory-installed.
Verify transformer connection
Prior to startup.
See diagram below.
Wire Harness
ALBER BATTERY MONITORING XFMR
F4
F5
F75
F76
V_OUT_A
V_OUT_C
eXL BATTERY CABINET
UPS MODULE OUTPUT
XFMR CONNECTION DIAGRAM
TOP TERMINALS FROM F5 FUSE IN BAT CAB
BOTTOM TERMINALS FROM F4 FUSE IN BAT CAB
0 V
200 V
208 V
240 V
270 V
300 V
X1
230 V
X2

Table 2 Alber battery monitoring assembly connections

Input Voltage	Alber Transformer-2 (Wht)	Jumper	Alber Transformer-1 (Blk)	F4-F5 Fuse Rating
480	0 (Top)	240 (Top) to 0 (Bottom)	240 (Bottom)	1.25 A, 600VAC

Figure 24 Top-Terminal battery configuration

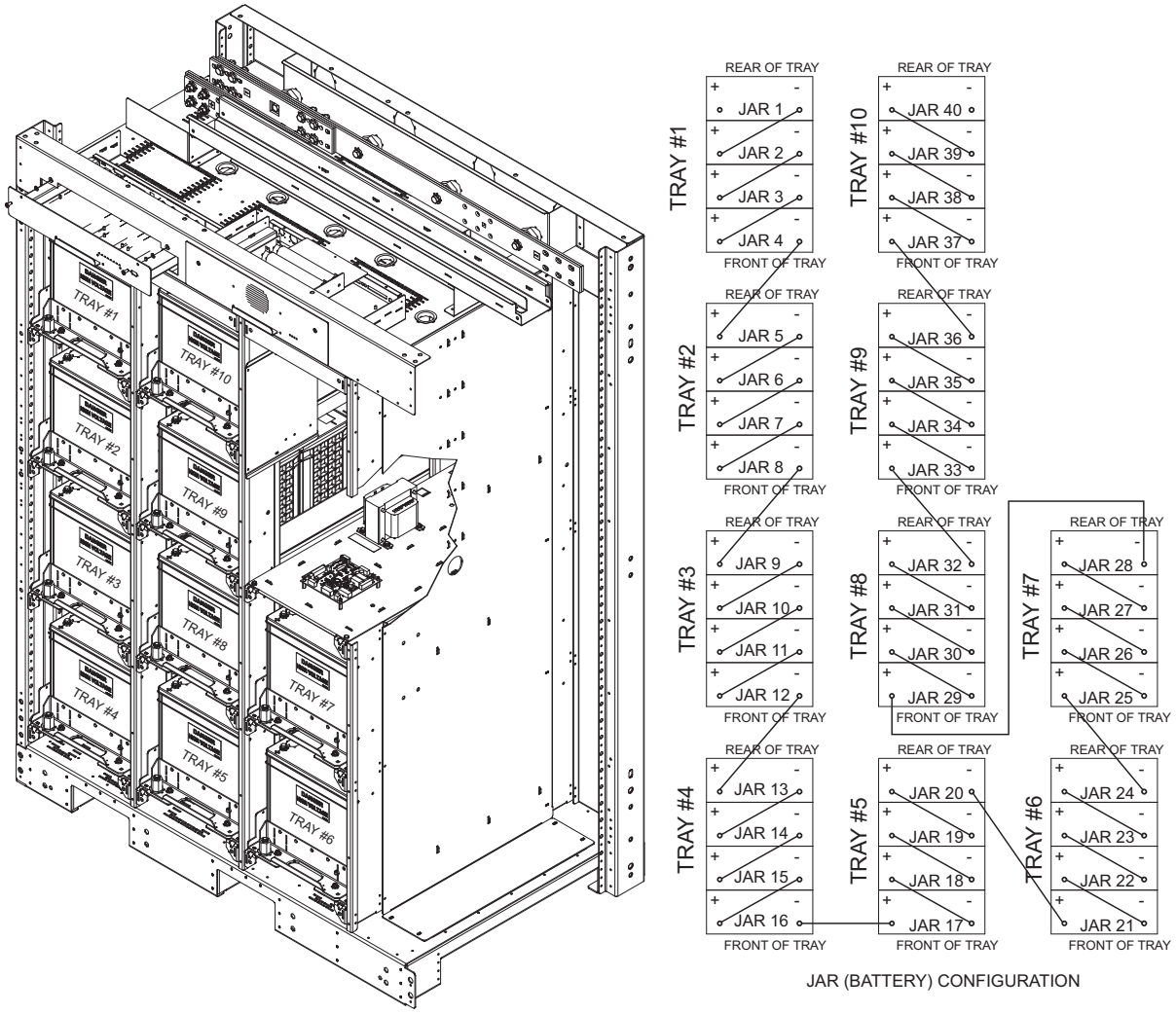
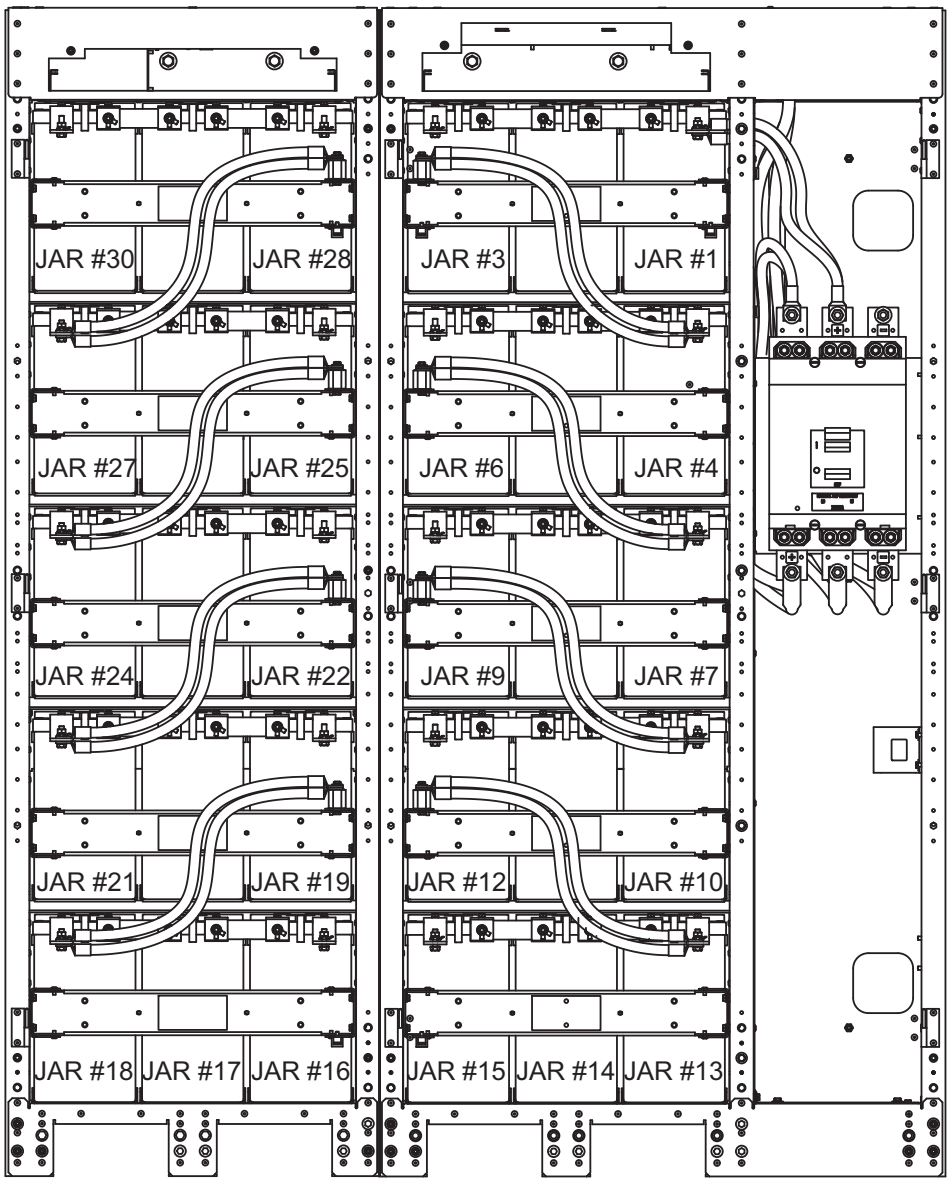


Figure 25 Front-Terminal battery configuration



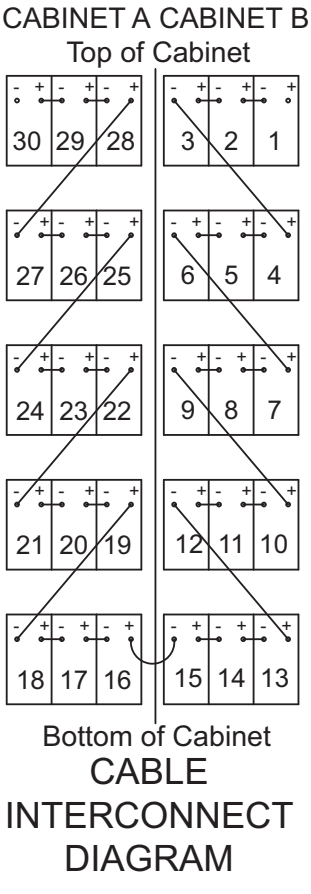
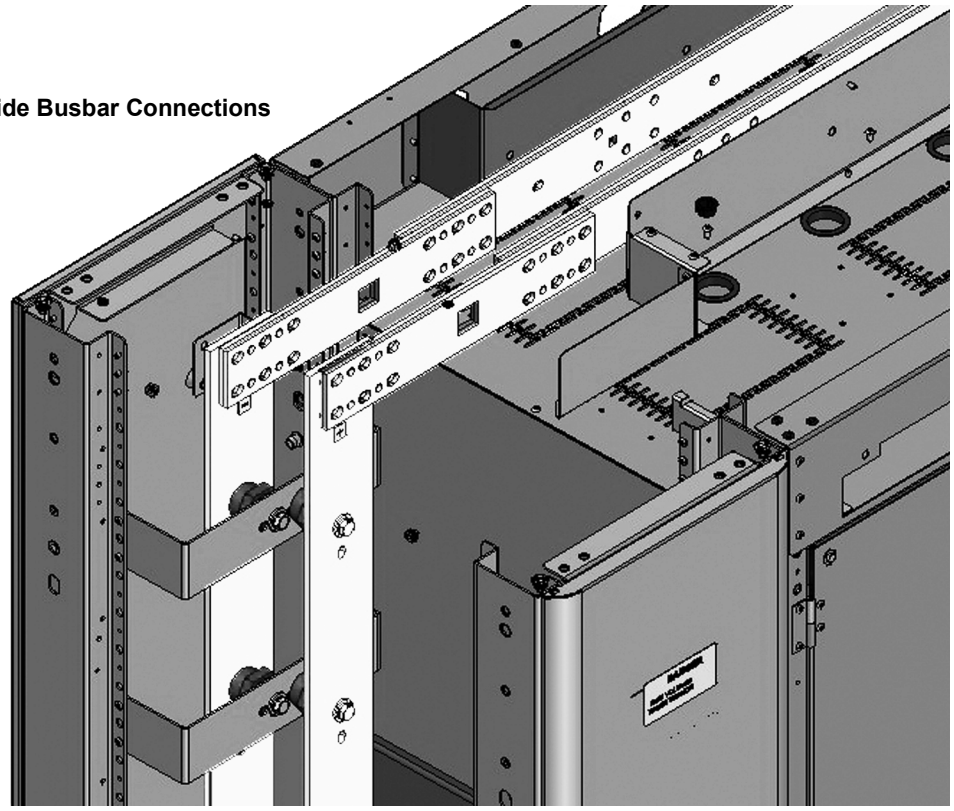


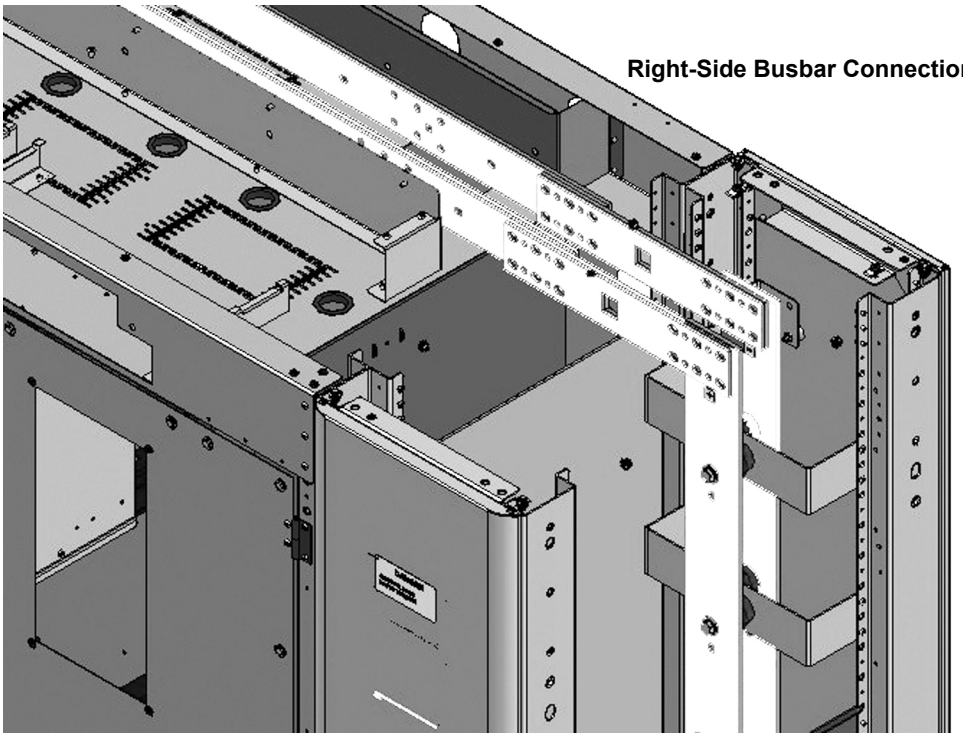
Figure 26 Busbar connection between Battery Cabinet and Attached Junction Cabinet

Left-Side Busbar Connections



Note: This connection is the same for top-terminal (12V) battery cabinets and front-terminal (16V) battery cabinets.

Right-Side Busbar Connections



4.0 SPECIFICATIONS

Table 3 Liebert *e*XL Battery Cabinet specifications

Battery Cabinet Parameters	Values	
	Top-Terminal Cabinet	**Front-Terminal Cabinet**
Battery Type	VRLA (Valve Regulated Lead Acid)	
Nominal Battery Bus, VDC	480V	
Battery Float Voltage, VDC	540V	
Minimum EOD Voltage, VDC	384V (for VRLA / Flooded Lead Acid)	
Battery Discharging Maximum Current (EOD), A	See **Table 6**	
Physical Parameters and Standards		
Width, in. (mm) [1]	56.5 (1435)	63.0 (1600)
Depth, in. (mm) [2]	33.5 (850)	33.5 (850)
Height, in. (mm)	76.8 (1950)	76.8 (1950)
Weight, lb (kg) approx.	**Table 8**	
Standard Color	Black (ZP-7021)	
Front Door Opening (for serviceability)	More than 180°	
Degree of Protection for UPS Enclosure	IP 20 (with and without front door open)	
Minimum Clearance, Top	24" (610mm)	
Minimum Clearance, Back	0"	
Minimum Clearance, Sides	0"	
Cable Entrance	Top or Bottom	
Standards & Conformities	UL 1778; CSA 22.2 107.3 FCC Part 15, Class A; ISTA Procedure 1H; WEEE; IBC 2012/CBC 2010	
Environmental		
Storage Temperature Range, °F (°C)	-13°F to 158°F (-25°C to 70°C) 74°F to 80°F (23-27°C) for optimal battery life	
Operating Temperature Range, °F (°C)	32°F to 104°F (0 to 40°C) 74°F to 80°F (23-27°C) for optimal battery life	
Relative Humidity	up to 95% Non-Condensing (Operating and Non-Operating)	
Maximum Altitude Above MSL, ft (m)	4920 (1500) (as per IEC 62040/3) - 1% Maximum kW derate / 100m rise between 1500-3000m	

1. Width dimensions are with side panels attached. Subtract 1.4" (35mm) for dimensions without side panels.
2. Depth dimensions include the front door and rear panel.

Table 4 Liebert eXL Junction Cabinet specifications

Battery Specifications	Value		
	Top-Terminal Attached	Stand-Alone	Attached
Nominal Battery Bus, VDC	480V		
Battery Float Voltage, VDC	540V		
Minimum EOD Voltage, VDC	384V (for VRLA / Flooded Lead Acid)		
Battery Discharging Max current (EOD), A	**Table 6**		
Physical Parameters			
Width, * in (mm)	15.5 (393)	30.9 (785)	17.5 (445)
Depth, in (mm) **	33.5 (850)	33.5 (850)	33.5 (850)
Height, in (mm)	76.8 (1950)	76.8 (1950)	76.8 (1950)
Weight, lb (kg) approx.	255 (115)	400 (180)	255 (115)
Color	Black (ZP-7021)		
Degree of Protection for UPS Enclosure	IP 20		
Minimum clearance, Top	24" (610mm)		
Minimum clearance, Back	0"		
Minimum clearance, Sides	0"		
Location of cable entrance	Top or Bottom		
Standards and Conformities	UL 1778; CSA 22.2 107.3; FCC Part 15, Class A ISTA Procedure 1H; WEEE; IBC 2012/CBC 2010		
Environmental			
Storage Temperature Range, °F (°C)	-13°F to 158°F (-25°C to 70°C)		
Operating Temperature Range, °F (°C)	32°F to 104°F (0 to 40°C)		
Relative Humidity	Maximum 95% Non-Condensing (Operating and Non-Operating)		
Maximum Altitude above MSL, ft (m)	4920 (1500) (as per IEC 62040/3) - 1% maximum kW derate / 328ft rise between 4900-9800ft (100m rise between 1500-3000m)		

* Width dimensions are with side panels attached. Subtract 1.4" (35mm) for dimensions without side panels.

** Depth dimensions include the front door and rear panel.

Table 5 Alber® battery monitoring option specifications

Electrical Data	Value
Input Voltage	220-600VAC
Input Current	< 0.5A
Frequency	60Hz

Table 6 DC currents for Liebert eXL modules

UPS Rating		Max Battery Current at EOD
kVA	kW	
625	625	1614
750	675	1936
800	800	2066

Table 7 Liebert *e*XL Battery Cabinet internal breaker

Model # Code	Battery Type	Required Breaker Thermal Trip Amps
PR	UPS12-300MR	400
RR	UPS12-350MR	450
UR	UPS12-400MR	500
WS	UPS12-490MRLP	600
XR	UPS12-540MR	600
PX	HX300-FR	400
RX	HX330-FR	450
UX	HX400-FR	500
WX	HX500-FR	600
XX	HX540-FR	600
2K	16HX800F-FR	250kVA - 700A 300kVA - 800A 400kVA & above - 900A
4K	16HX925F-FR	600
RA	27HR3500	400
UA	31HR4000	500
WA	31HR5000	600
PG	XE60	700
PH	XE60 w/Jacket	700
VG	XE95	700
VH	XE95 w/Jacket	700

Table 8 Liebert *e*XL Battery Cabinet approximate weights

Battery Code	Manufacturer	Battery Model	Total Weight lb (kg)
PR	C&D Batteries	UPS12-300MR	3910 (1774)
RR		UPS12-350MR	4265 (1935)
UR		UPS12-400MR	4600 (2087)
WS		UPS12-490MRLP	5545 (2515)
XR		UPS12-540MR	5545 (2515)
PX	Enersys	HX300-FR	3760 (1706)
RX		HX330-FR	4200 (1905)
UX		HX400-FR	4760 (2159)
WX		HX500-FR	5750 (2608)
XX		HX540-FR	5850 (2653)
2K		16HX800F-FR	8510 (3860)
4K		16HX925F-FR	8990 (4078)
PG		XE60	3586 (1626)
PH		XE60 w/Jacket	3586 (1626)
VG		XE95	4706 (2135)
VH		XE95 w/Jacke	4706 (2135)
QA	East Penn	27HR3500	4000 (1814)
SA		31HR4000	4320 (1960)
WA		31HR5000	5280 (2395)

Table 9 Recommended external conduit and cable sizes from Liebert *e*XL UPS to DC source

UPS Rating kVA	(# of conduits); size of conduits;# -size of phase cables per conduit; size of cable for ground per conduit	
	Copper Conductors	Aluminum Conductors
625	(6) 3.0"C; 2-600kcmil; #350kcmil	(7) 3.5"C 2-700kcmil; #600kcmil
750	(6) 3.0"C; 2-600kcmil; #350kcmil	(7) 3.5"C 2-700kcmil; #600kcmil
800	(6) 3.0"C; 2-600kcmil; #350kcmil	(7) 3.5"C 2-700kcmil; #600kcmil

1. Recommended cable sizes are 167°F (75°C) (THW) wire at 86°F (30°C) ambient. Unless otherwise noted, use copper or aluminum conductors suitable for at least 167°F (75°C).
2. For continuous operations not at 86°F (30°C), Emerson recommends that the site planner choose the appropriate cable type based on the particular installation requirements.
3. Conduit size is based on RNC type conduit

Table 10 Recommended lug sizes

Cable Size	T&B Copper One Hole	T&B Copper Two Hole	T&B Aluminum One Hole	T&B Aluminum Two Hole
#8AWG	54930BE	54850BE	60104-TB	—
#6AWG	54905BE	256-30695-868	60109-TB	—
#4AWG	54906BE	256-30695-733	60114-TB	—
#2-3AWG	54942BE	54811BE	60120	—
#1AWG	54947BE	54857BE	60126	—
#1/0AWG	54950BE	256-30695-593	60132	—
#2/0AWG	54951BE	54862BE	60138	60238
#3/0AWG	54965BE	54864BE	60144	60244
#4/0AWG	54970BE	54866BE	60150	60250
250kcmil	54913BE	54868BE	60156	60256
300kcmil	54914BE	54870BE	60162	60262
350kcmil	54915BE	54872BE	60165	60267
400kcmil	54916BE	54874BE	60168	60269
500kcmil	54918BE	54876BE	60171	60273
600kcmil	54920BE	54878BE	60176	60275
750kcmil	54922BE	54880BE	60178	60277

Table 11 Battery torque values

Battery Code	Manufacturer	Battery Model	Torque Value in-lb (Nm)
PR	C&D Batteries	UPS12-300MR	110 (12.4)
RR		UPS12-350MR	110 (12.4)
UR		UPS12-400MR	110 (12.4)
WS		UPS12-490MRLP	110 (12.4)
XR		UPS12-540MR	110 (12.4)
PX	Enersys	HX300-FR	65 (7.3)
RX		HX330-FR	65 (7.3)
UX		HX400-FR	65 (7.3)
WX		HX500-FR	65 (7.3)
XX		HX540-FR	65 (7.3)
2K		16HX800F	100 (11.3)
4K		16HX925F	100 (11.3)
PG		XE60	60 (6.8)
PH		XE60 w/Jacket	60 (6.8)
VG		XE95	60 (6.8)
VH		XE95 w/Jacket	60 (6.8)
QA	East Penn	27HR3500	65 (7.3)
SA		31HR4000	65 (7.3)
WA		31HR5000	65 (7.3)

Table 12 Torque specifications, unless otherwise labeled

Nut and Bolt Combinations		
Bolt Shaft Size	**Grade 2 Standard lb-in (Nm)**	**Electrical Connections with Belleville Washers lb-in (Nm)**
1/4 (M6)	53 (6.0)	46 (5.2)
5/16 (M8)	107 (12)	60 (6.8)
3/8 (M10)	192 (22)	95 (11)
1/2 (M12)	428 (48)	256 (29)
Circuit Breakers with Compression Lugs (For Power Wiring)		
Current Rating	**lb-in (Nm)**	**—**
400 - 1200 Amps	300 (34)	—
Circuit Breakers with Compression Lugs (For Control Wiring)		
AWG Wire Size or Range	**lb-in (Nm)**	**—**
#22 - #14	3.5 to 5.3 (0.4 to 0.6)	—

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